PB81-199366

# A Summary of the EPA National Source Performance Audit Program - 1979

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Research Triangle Park, NC

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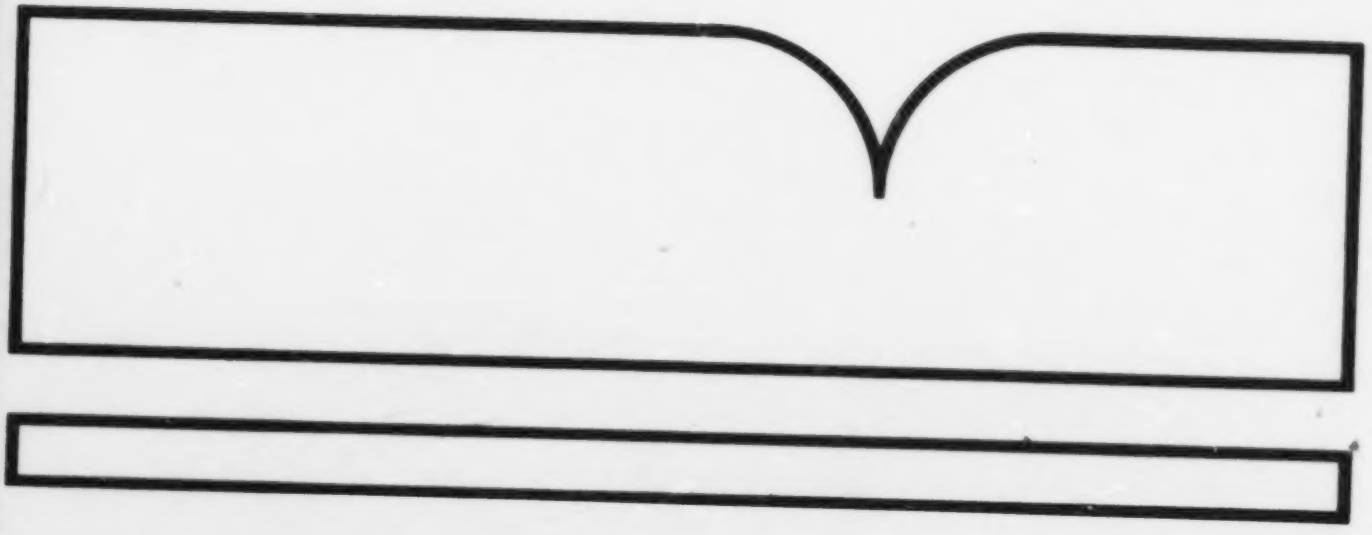

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EPA 600/4-81-029
April 1981

PB81-199366

# A SUMMARY OF THE EPA NATIONAL SOURCE PERFORMANCE AUDIT PROGRAM - 1979

by

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16. ABSTRACT

A national quality assurance audit program for methods used in stationary source tests was conducted in 1979 by the Quality Assurance Division of the Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. In this program, quality assurance materials were sent to interested participants for the measurement of a gas volume (Method 5, dry gas meter only) or the analysis of liquid samples simulating collected sulfur dioxide and nitrogen oxides (Method 6 and 7, respectively). Each participant returned the analytical results to the Source Branch, Quality Assurance Division, for evaluation. An individual report was returned to each participant after processing.

This report summarizes the audit results of 1979 for those three source test methods.

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# FOREWORD

Measurement and monitoring research efforts are designed to anticipate potential environmental problems, to support regulatory actions by developing an in-depth understanding of the nature and processes that impact health and the ecology, to provide innovative means of monitoring compliance with regulations, and to evaluate the effectiveness of health and environmental protection efforts through the monitoring of long-term trends. The Environmental Monitoring Systems Laboratory, Research Triangle Park, North Carolina, has responsibility for: assessment of environmental monitoring technology and systems; implementation of agency-wide quality assurance programs for air pollution measurement systems; and supplying technical support to other groups in the Agency including the Office of Air, Noise and Radiation, the Office of Toxic Substances and the Office of Enforcement.

The major task of this study was to report the results of the national quality assurance audit program for stationary source test methods. Audits were designed to estimate the minimal analytical and computational accuracy that can be expected with EPA Method 5 (dry gas meter only), Method 6 (sulfur dioxide) and Method 7 (nitrogen oxides). Statistical analysis was used to characterize the data.

Thomas R. Hauser, Ph.D.
Director
Environmental Monitoring Systems Laboratory
Research Triangle Park, North Carolina

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## ABSTRACT

A national quality assurance audit program for methods used in stationary source tests was conducted in 1979 by the Quality Assurance Division of the Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. In this program, quality assurance materials were sent to interested participants for the measurement of a gas volume (Method 5, dry gas meter only) or the analysis of liquid samples simulating collected sulfur dioxide and nitrogen oxides (Method 6 and 7, respectively). Each participant returned the analytical results to the Source Branch, Quality Assurance Division, for evaluation. An individual report was returned to each participant after processing.

This report summarizes the audit results of 1979 for those three source test methods.

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## ACKNOWLEDGMENTS

Our deep appreciation is extended to each of the audit participants. In addition, we also express thanks to the Standards Laboratory (Performance Evaluation Branch, EMSL) who analyzed the audit samples under our Acceptance Testing Program, and the programmers of the Data Management and Analysis Division, EMSL, for providing the data management systems necessary to store and summarize the data.

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# SECTION 1

# INTRODUCTION

One of the fundamental responsibilities of laboratory management is the establishment of a continuing program to insure the reliability and validity of generated data. This is accomplished by a strong quality assurance program.

To assist in this type of program, the Environmental Monitoring Systems Laboratory (EMSL) of EPA in 1977 established a nationwide performance audit program (1,2) to insure that source emission data collected for compliance determination purposes are accurate and reliable. This program had three main purposes:

- to verify that the analytical and computational parts of the specific reference methods were being properly used,
- to assist wherever possible to improve the quality of the measurement being made,
- to aid the participating laboratories in assessing their analytical performance relative to that of other laboratories conducting similar analyses.

These goals were realized by sending specific performance materials to interested laboratories for analysis.

In the semiannual, source test method audits conducted in the spring and fall of 1979, the technique of volume measurement by a dry gas meter was examined. This measurement is essential to Methods 5, 8, 12, 13, and 17 (3). Also examined were the analytical and computational parts of

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Method 6 for sulfur dioxide ($SO_2$) (4) and Method 7 for nitrogen oxides ($NO_x$) (5). This report describes the preparation and evaluation of these tests.

## SECTION 2

## SUMMARY

EPA's National Quality Assurance Audit Program for Stationary Source Test Methods was conducted in the spring and fall of 1979. The methods examined were Method 5 (dry gas meter only), Method 6 ($SO_2$) and Method 7 ($NO_x$). The audits were conducted by the Quality Assurance Division (QAD) of EPA's Environmental Monitoring Systems Laboratory located in the Research Triangle Park, North Carolina. They involved laboratories from industry, contracting firms, universities, foreign countries, and governmental agencies.

A summary of the Method 5 data shows that an average of 77% of the 247 laboratories that requested samples returned data for the spring and fall studies. Comparing the reported results from these laboratories to the 2% Federal Register specification for dry gas meter accuracy (6), we find that in Audit 0379, 34% of the laboratories came within 2% of the EPA value, while in Audit 0879, 43% of the laboratories were able to do so.

A summary of Method 6 data shows an average of 72% of the 244 laboratories requesting samples returned data for the spring and fall studies. Of those laboratories reporting data, 50% of the laboratories came within an average of 1.7% of the EPA value for Audit 0379. For the 0979 audit they came within 2.1%.

A summary of Method 7 data shows an average of 64% of the 203 laboratories requesting samples returned data for the spring and fall audits. Of those laboratories returning data, 50% were able to come within an average of 7.8% of the EPA value for Audit 0379, while in Audit 1079 they came within 7.0%.

To examine previous audit data for trends, a certain degree of accuracy was chosen and plotted for each method. They were: 2% accuracy for Method 5 and 6, and 5% accuracy for Method 7.

Use was made in this report of an outlier test (Chauvenet's Criterion) to determine the values that lie outside the bulk of the collected data.

## SECTION 3

## RECOMMENDATIONS

To create a sample repository, the Quality Assurance Division of the Environmental Monitoring Systems Laboratory intentionally produced an oversupply of samples for the audits of EPA Methods 6 and 7 discussed in this report. These stable samples are available to any laboratory having a legitimate need for them, such as training new analysts and conducting periodic external quality control checks of the laboratory. Included with these practice samples is a statement of true concentration with no requirement for return of data to EPA. We recommend that all participants make use of this sample repository, to increase their overall analytical skills with typical Method 6 and 7 samples.

## SECTION 4

## AUDIT DESIGN

The source sample audit program discussed in this report incorporates the experience gained from previous audits in such areas as procedures, prospective participants, categorization and preparation of audit materials, and data handling.

### AUDIT PROCEDURES

All audits began with a master list of prospective laboratories which had in the past participated or indicated a wish to take part in such a program.

Prospective participants were sent an invitation to participate plus a description of the source methods being audited with instructions for participation. Through a response card, which is included with the invitation, each laboratory indicated if it wished to participate. Response cards were returned to the Source Branch (SB), QAD/EMSL who collected, logged, and forwarded a list of the participants to the EPA contractor preparing the audit materials for QAD. All participating laboratories are assigned an identification number to facilitate storage of their data in the computer's data bank and to maintain the confidentiality of each participant's results. At a prearranged date, requested audit materials were shipped to the participants with the instructions for sample analysis, a blank data card to report the completed analysis values, and a mailing label for return of the data card to QAD. After the data are reported to QAD, the participants receive a computer data sheet containing the results of their performances compared to the QAD accepted values for each sample. At the completion of each year, a summary of the total results will be published without reference to any specific laboratory.

## PROSPECTIVE PARTICIPANTS

Using a previously compiled master list of laboratories from past audits, invitations to participate in the semiannual source audit program for spring and fall of 1979 were sent to all volunteers who had previously participated in the audit program. Other laboratories were added to the master list through their direct contact with the SB/QAD or the Regional Quality Control Coordinator (RQCC).

## PREPARATION AND DISTRIBUTION OF AUDIT MATERIALS FOR METHODS 5, 6, AND 7

To provide a check on the calibration of the dry gas meter used in the Method 5 stack sampling train, a critical orifice device was developed to pass a certain flow rate of air through the dry gas meter when the measured vacuum on the orifice was at least 16 inches of mercury. This device allows an analyst to compare a volume measured at his location with one measured at an EPA location. Volumes measured at both locations are compared to the original calibration of the device with the effects of ambient temperature and pressure on the measurements taken into account. After initial calibration by an EPA contractor, each device is recalibrated by EPA laboratory personnel, who reject any device whose volume measurement does not fall within ± 2% of the original calibration. This process of verification of the original calibration is known as Acceptance Testing.

Participants in the Method 5 audit were instructed to insert the critical orifice device in the probe connection of their gas sampling meter box, and, after a warmup period, to take three 15 min volume measurements. Using Equation 5-1 of Method 5 (3), they were to calculate each of the three volumes in cubic meters and record the volumes on the data card along with other pertinent information concerning sampling conditions. Participants were then to mail the device and data card to EPA for comparison of volumes. Since some meter boxes had diaphragm pumps that could not pull the 16 inches of mercury vacuum necessary to produce critical flow with the standard orifice, smaller orifices were constructed to allow the pumps to pull the required vacuum. All orifices are recalibrated upon return to EPA.

For the audits of Methods 6 and 7, five different concentration levels of simulated source $SO_2$ and $NO_x$ samples were prepared for the participants to analyze and calculate using Methods 6 and 7. The true values of these samples were based on theoretical concentrations calculated from gravimetric preparations and certain assumed volume measurements. After sample solutions were made, their concentrations were verified with ion-chromatographic methods. Because the audit solutions contained only the specie to be identified, this very accurate procedure could be used in place of the reference method. This verification step was initially conducted by contractor personnel and then by EPA personnel, via Acceptance Testing.

Approximately 20 ml of each Method 6 and Method 7 sample solution was sealed in a 25 ml glass ampoule, and five different concentration levels were shipped to the participating laboratories. The ampoules containing $NO_x$ samples were autoclaved to destroy bacteria that might possibly attack the solutions.

Instructions for the Method 6 samples prescribed that 5 ml of the test solution be diluted to 100 ml through the addition of 30 ml of 3% hydrogen peroxide ($H_2O_2$) and distilled water. An aliquot of this solution was then titrated with barium perchlorate ($Ba[ClO_4]_2$) in the presence of thorin indicator to the characteristic peach color endpoint. Barium chloride ($BaCl_2$) is also an acceptable alternative titrant. To complete Method 6 calculations, the participants assumed they had an original sample volume of 100 ml, and had sampled $21 \times 10^{-3}$ DSCM (dry standard cubic meter) of stack gas.

The analysis of Method 7 samples involved dilution of a 5 ml aliquot of the original test sample with 25 ml of absorbing reagent, adjustment of the pH to between 9 and 12, and followed by dilution to 50 ml with distilled water. After a digestion procedure, a colorimetric analysis followed. To complete Method 7 calculations, the participants assumed they had sampled 2000 ml of stack gas.

The audit instructions for all three methods are contained in Appendix D. In each of our audits, the samples were number coded. The key for the five concentration levels was based on the first digit of the sample number.

## SECTION 5

## PERFORMANCE CRITERIA

Establishment of performance criteria so that each participating laboratory can evaluate their reported data is a major part of any quality assurance program. The setting of performance criteria is somewhat arbitrary, however, because they are based either on previously reported data or on certain expected results.

In our program the performance criteria are based on data from previous audits. In this way laboratories can compare their reported results with the results of other laboratories analyzing similar samples.

These performance ranges are displayed through use of frequency distributions of percent difference. Percent difference is the difference between the EPA value for a specific sample and the laboratories' reported values. The frequency distribution data compare the percent difference between all reported sample results with the QAD accepted value for each sample.

Although statistical comparisons are made between different audits for different years for the same pollutant, each laboratory participating in an audit can use different analysts for each audit. Thus, any increase in overall accuracy could mean the analysts are becoming more familiar with the methods, or that more competent analysts are being used.

The statistical outlier test, Chauvenet Criterion (7), was used here only to point out suspected pieces of data. Data removal by an outlier test does not mean the data are bad but that they lie outside the bulk of the collected data.

## SECTION 6

## DISCUSSION OF METHOD 5 AUDIT RESULTS

The distribution of the types of laboratories responding to audits 0379 and 0879 about Method 5 (dry gas meter only) is shown in Tables 1 and 2 below.

TABLE 1. METHOD 5 AUDIT 0379

| | Laboratory Distribution | | | | | | |
|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | Total |
| Laboratories requesting samples | 52 | 28 | 5 | 2 | 15 | 4 | 106 |
| Laboratories returning data | 38 | 21 | 5 | 1 | 14 | 3 | 82 |

TABLE 2. METHOD 5 AUDIT 0879

| | Laboratory Distribution | | | | | | |
|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | Total |
| Laboratories requesting samples | 81 | 32 | 5 | 3 | 14 | 6 | 141 |
| Laboratories returning data | 67 | 23 | 3 | 2 | 12 | 4 | 111 |

About 22% of participants requested audit samples but did not analyze and return their data in these two source audits. Probable causes for not returning data are either conflicts with scheduled work or oversights -- failure to schedule the analysis of the QA samples during the alloted time period. These

two reasons would not bias the statistics of an audit. However, if the sample results were not returned because of suspected inaccuracy of the data, the audit statistics would be biased. Without extensive examination the reason for nonreturn of data cannot be determined in a volunteer audit program.

In case analytical problems do arise, the audit participant may obtain practice samples with their specific volumes (Method 5) or concentrations (Method 6 or 7) listed.

Participants in these audits were instructed to take three 15 min volume measurements, calculate each volume at standard conditions in cubic meters using Equation 5-1 of Method 5 and report their results on the blank data card provided.

Since the compared results have been reported in percents, the participant can readily discover his standing in the overall group of participants by examining the data in Appendix A. The data in the appendix is a signed percent difference. Percent difference has been calculated as follows:

$$PD = \frac{RV - TV}{TV} \times 100 \qquad (1)$$

$$APD = \left|\frac{RV - TV}{TV}\right| \times 100 \qquad (2)$$

where: PD = percent difference (shows positive or negative sign)
APD = absolute percent difference
RV = reported value
TV = true value
100 = factor to change decimal to percent

The cumulative histogram in Figure 1 displays the accuracy obtained in the Method 5 Audits 0379 and 0879 when the reported values are compared against the true value determined by EPA and contractor measurements. The Code of Federal Regulations (6) requires that the dry gas meter for Method 5 be accurate to ± 2%. In Figure 1 we find only 34 and 43 percent of the laboratories (respectively) making these measurements in both audits were

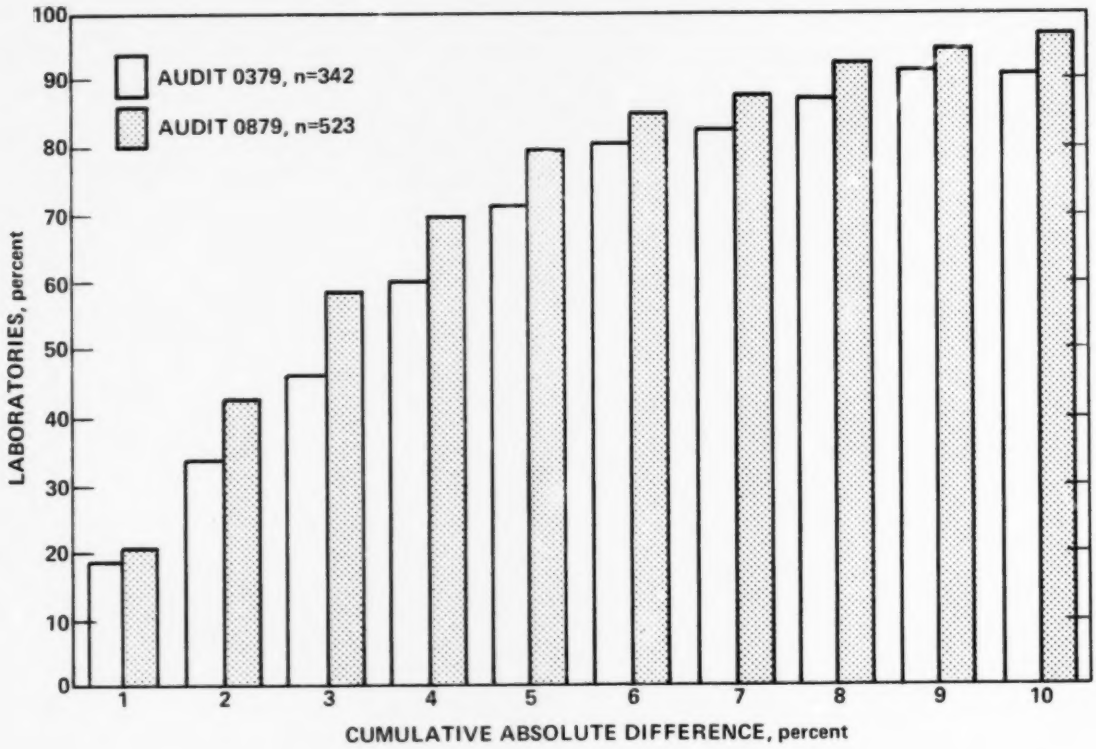


Figure 1. Method 5 audits 0379 and 0879 cumulative frequency histogram.

able to come within ± 2% of volume. This does indicate a slight improvement in analytical capability of the participants from one audit to the next because: (a) the number of determinations used to calculate the statistics in Audit 0879 was larger, and (b) 57 of the 82 laboratories that analyzed samples in Audit 0379 also analyzed samples in Audit 0879. This second fact establishes a good data base from which to calculate trends.

Using absolute values, Figures 2 and 3 show a histogram of the standard deviation developed by each laboratory from triplicate determinations (precision) of the measured volumes. The results indicate that, for Audit 0379, 68% of the standard deviations of the triplicate measurements came within 0.3% for each set; for Audit 0879, 65%.

Using signed data, Figures 4 and 5 are histograms that show the mean and median value coincided at -2.8% after outliers were removed in the 0379 audit. In the 0879 audit the mean and median values are -1.7 and -1.8%, respectively. Both diagrams show that approximately 75% of all reported values fall below the EPA calibration value, which is represented on both histograms as the zero value. All outliers (7% for Audit 0379 and 4% for Audit 0879) were removed using Chauvenet's Criterion.

The negative bias can be caused by leakage in the wet test or the dry test meter. There are several helpful publications on troubleshooting these test meters (8,9,10). Before EPA will accept an orifice, its calibration must agree within ± 2% of the original contractor value; otherwise, it is returned to the contractor for cleaning and recalibration. This method conforms to EPA's Acceptance Testing Program, in which the EPA contractor's determinations are verified by an independent EPA laboratory. Although the volume determinations made with the meter boxes are expected to be within ± 2%, all participants' values have been adjusted to the original contractor calibration.

Figures 4 and 5 can be used by the participant for self-evaluation. Each laboratory can set its own expected percent difference based on what others are doing under similar circumstances.

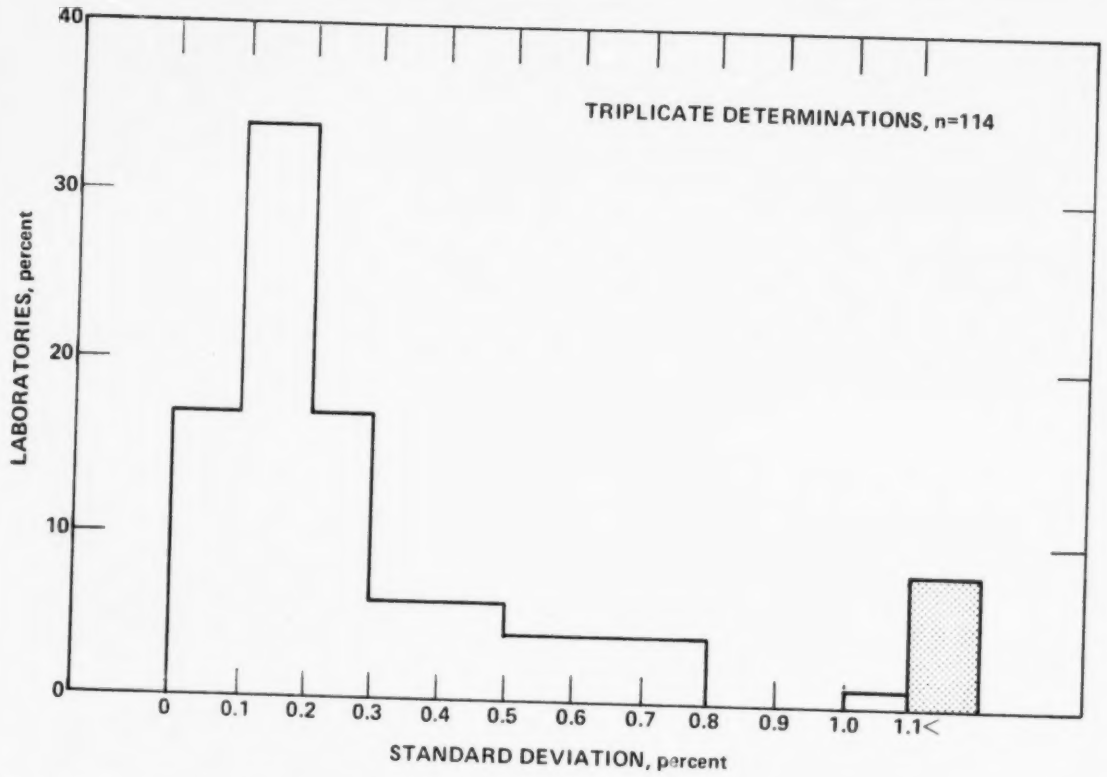


Figure 2. Method 5 audit 0379 histogram of percent standard deviation.

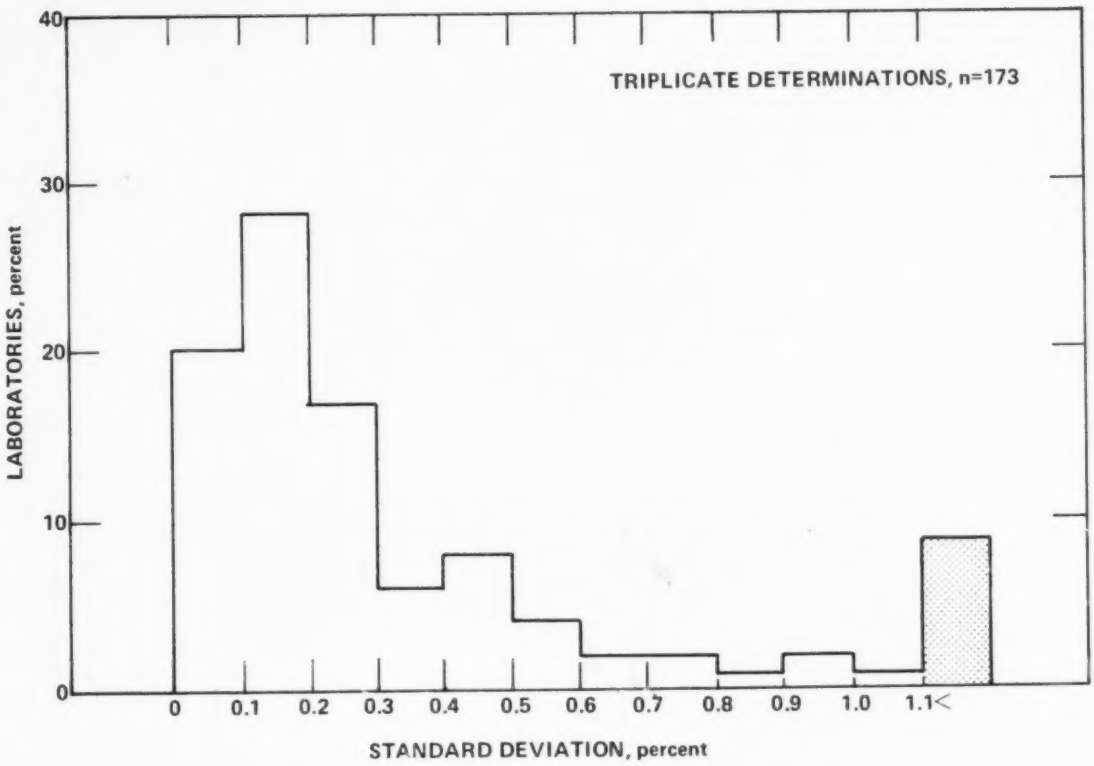


Figure 3. Method 5 audit 0879 histogram of percent standard deviation.

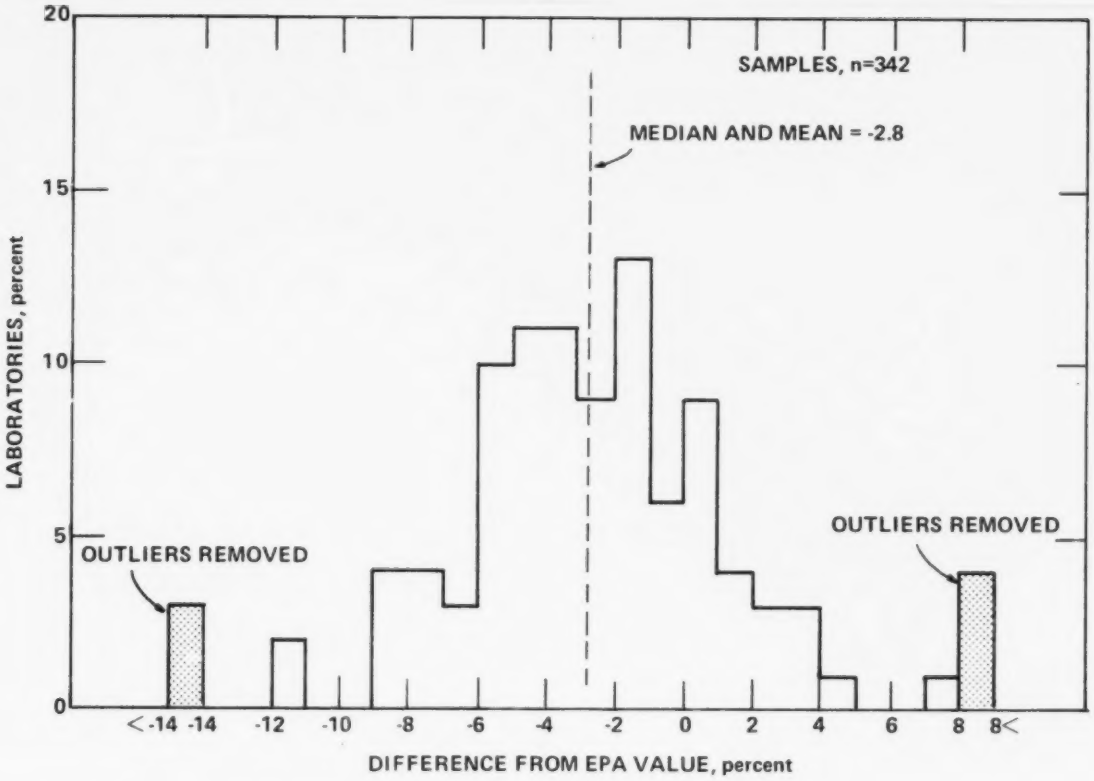


Figure 4. Method 5 audit 0379 histogram of results.

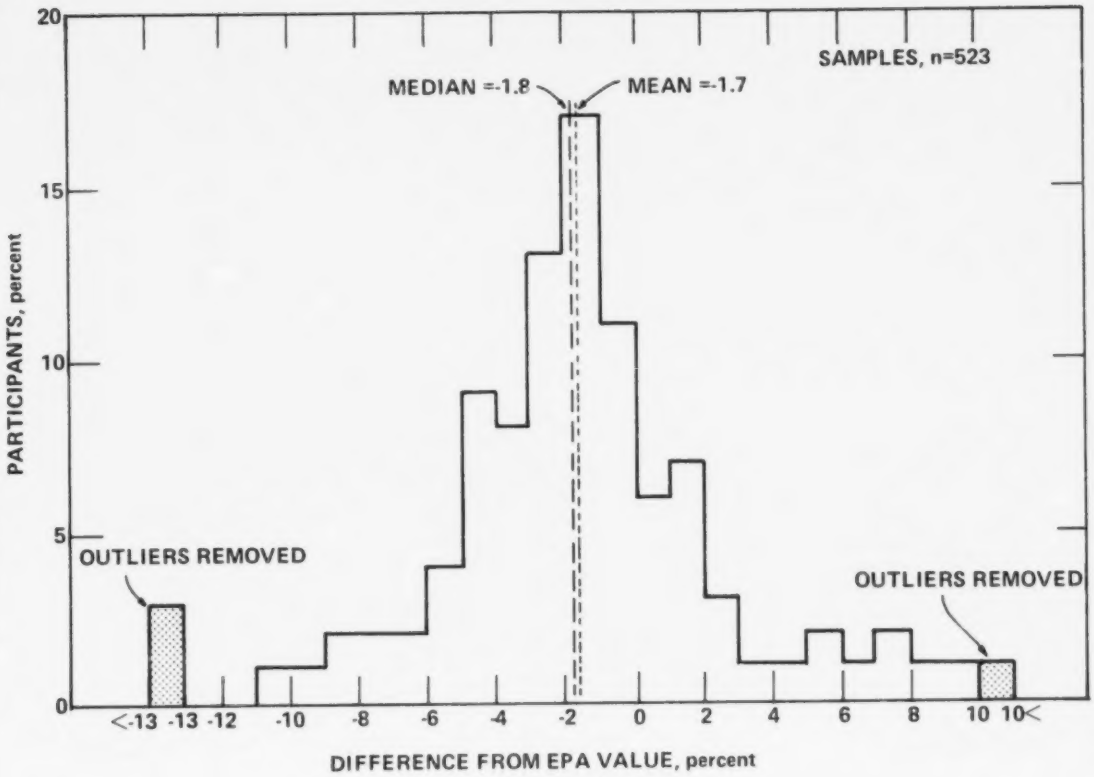


Figure 5. Method 5 audit 0879 histogram of results.

Since the mean and median values were close, and since skewness (reflecting the asymmetry of the data), was close to zero (0.01 for Audit 0379, and 0.07 for Audit 0879), the data were treated as normally distributed although the 0879 histogram does show long-tailing. (Normally distributed data is a basic assumption for the use of Chauvenet's Criterion outlier test.)

Examining previous audit data for Method 5 (Figure 6), we find an increasing trend when we calculate the percent of measurements that came within 2% of the EPA value. The number of measurements are also increasing with each audit.

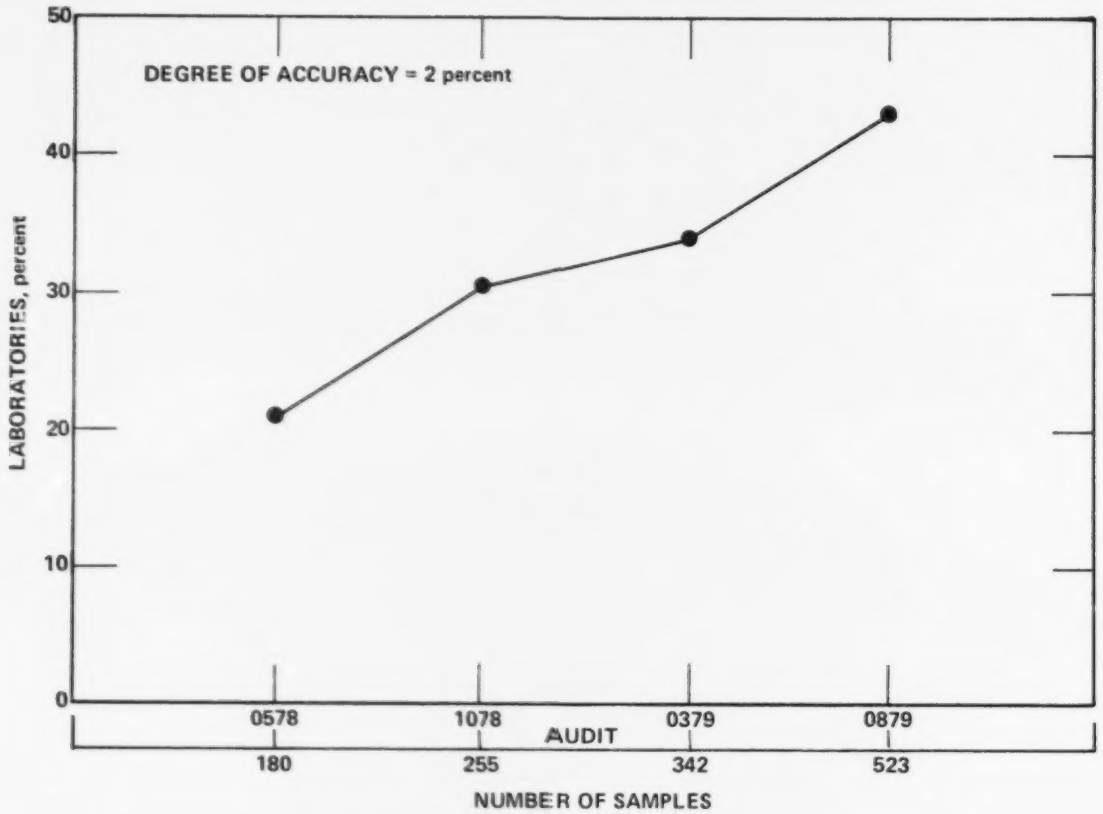


Figure 6. Previous results of method 5 audit.

## SECTION 7

## DISCUSSION OF METHOD 6 AUDIT RESULTS

The distribution of participants in the Method 6 Audits 0379 and 0979 is shown in Tables 3 and 4 below.

TABLE 3. METHOD 6 AUDIT 0379

| | Laboratory Distribution | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | University | Total |
| Laboratories requesting samples | 63 | 21 | 4 | 1 | 16 | 8 | 1 | 111 |
| Laboratories returning data | 45 | 17 | 3 | 1 | 13 | 4 | 0 | 83 |

TABLE 4. METHOD 6 AUDIT 0979

| | Laboratory Distribution | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | University | Total |
| Laboratories requesting samples | 80 | 25 | 3 | 2 | 15 | 8 | 0 | 133 |
| Laboratories returning data | 56 | 16 | 1 | 1 | 11 | 7 | 0 | 92 |

Participants were instructed to use Method 6 for all analyses and report their results (mg $SO_2$/DSCM), based on Equation 6-2 of Method 6 (3) on a blank data card.

Figure 7 is a frequency distribution depicting the data collected from the Method 6 Audits 0379 and 0979. Each decade percent line is made up of five points, which are plots of the absolute percent difference, representing the results of a particular percentage of the laboratories. The samples are listed for each audit in order of increasing concentration level from left to right. As an example, using the 0379 audit data plot we find that 50% of the participants analyzing the lowest sample concentration (#3 = 228.8 mg $SO_2$/DSCM) were 2.4% or less from the EPA value. In Audit 0979, 50% of the participants analyzing its lowest concentration sample (#4 = 305 mg $SO_2$/DSCM) were 2.2% or less from the EPA value.

Examining Figure 7 for the 0379 audit shows that Sample #3 (lowest concentration of the five audit samples) had the highest absolute percent difference from the EPA value at all percentile levels. This could be expected because a slight error at low concentrations will render a larger relative percent error than the same error at a higher concentration. This same situation is also noticed in Sample #4 for the 0979 Method 6 audit. Sample #1 (the mid-range sample) in Audit 0379 was the sample that most participants analyzed well, comparing all results. Although the differences are slight between Samples #2, #3, and #6 in Audit 0979, the analysts were able to analyze #6 better than the other four sample concentrations. Most analysts had trouble analyzing the lowest and highest sample concentration (#4 and #9, respectively) in Audit 0979, while in Audit 0379 only the lowest concentration gave them trouble. Contained in Appendix B are all the reported Method 6 data used to develop the summary statistics.

Examining two sample concentration levels from previous Method 6 audits (Figure 8), we do not find any indication of improvement when we use a 2% degree of accuracy limit. The lower range sample averages 36% while the upper range sample gives 66%, neglecting the last Method 6 audit 0979 results. With the Method 6 audits, analysts did better with higher concentration samples than at low concentrations.

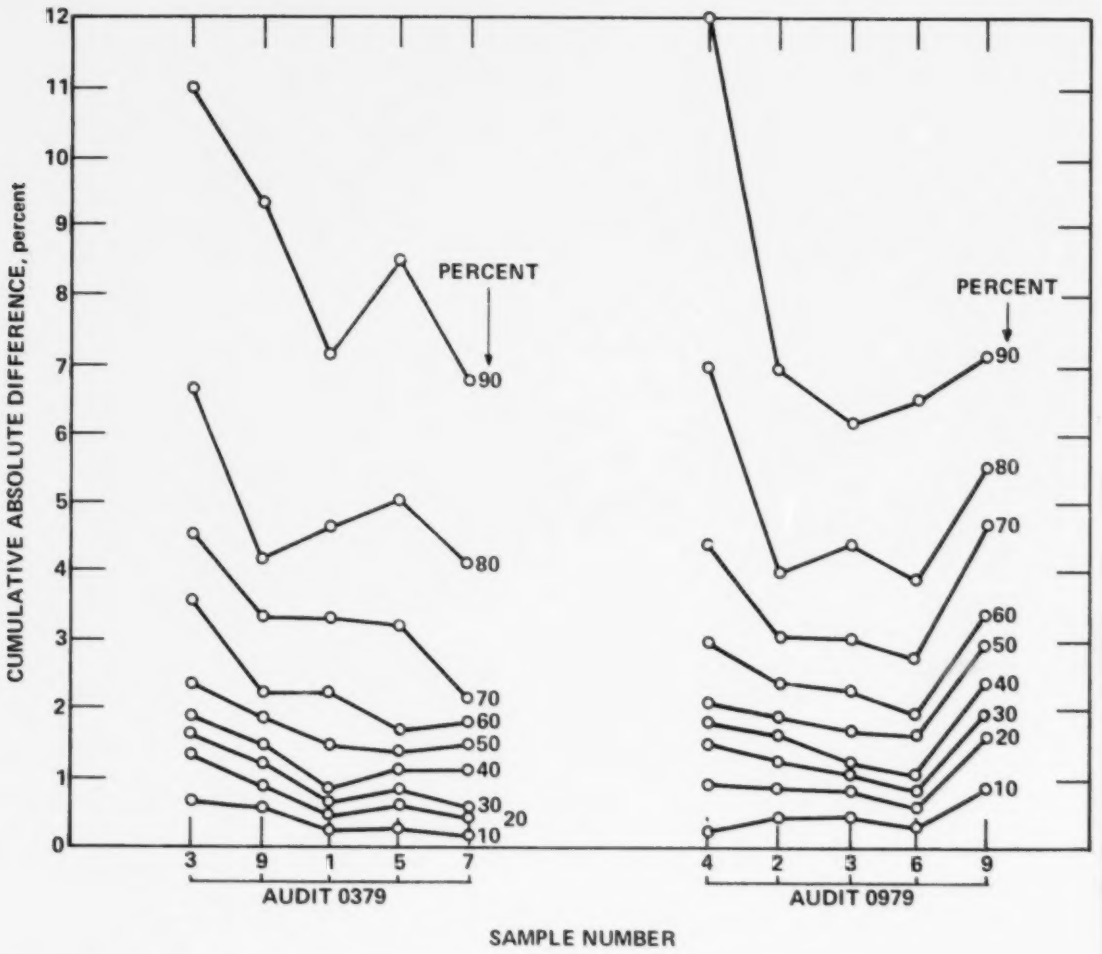


Figure 7. Method 6 audit 0379 and 0979 cumulative frequency distribution.

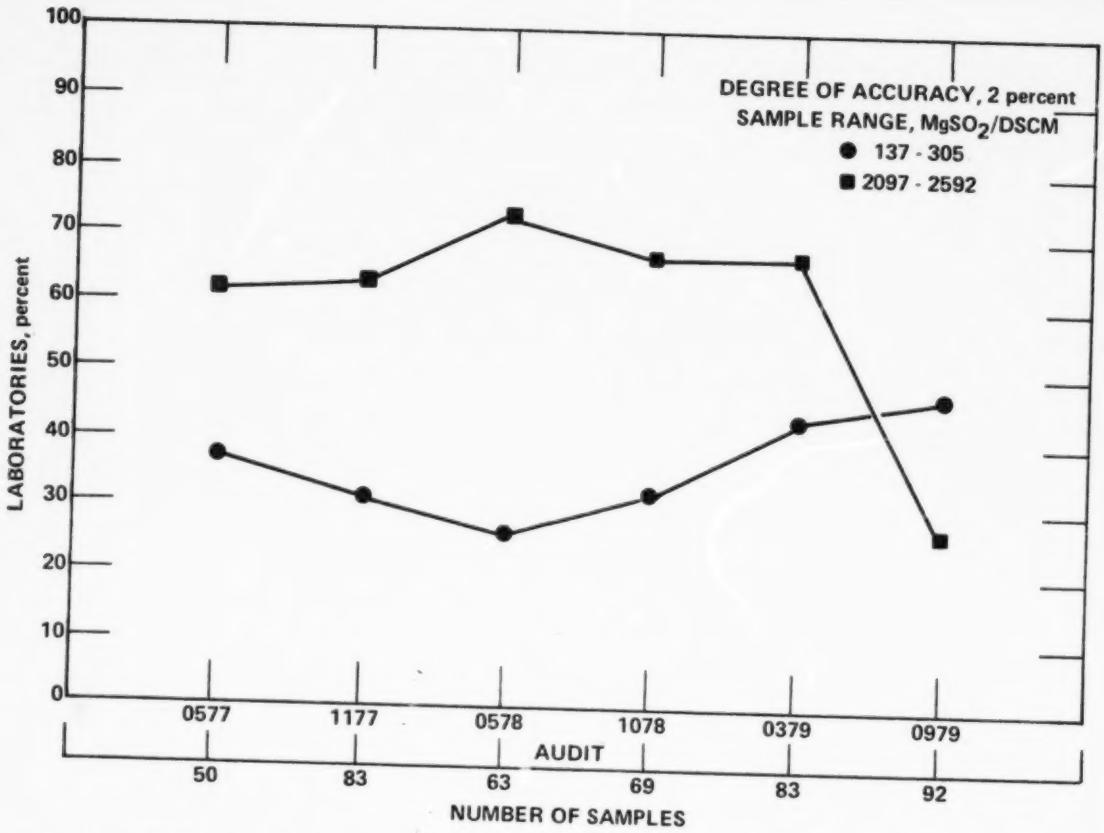


Figure 8. Previous results of method 6 audit.

## SECTION 8

## DISCUSSION OF METHOD 7 AUDIT RESULTS

Tables 5 and 6 (below) show the distribution of samples in Audits 0379 and 1079 for the $NO_x$ method.

TABLE 5. METHOD 7 AUDIT 0379

| | Laboratory Distribution | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | University | Total |
| Laboratories requesting samples | 58 | 13 | 3 | 1 | 10 | 5 | 1 | 91 |
| Laboratories returning data | 41 | 11 | 2 | 1 | 9 | 4 | 0 | 68 |

TABLE 6. METHOD 7 AUDIT 1079

| | Laboratory Distribution | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Contractor | Industrial | Foreign | Federal | State | Local | University | Total |
| Laboratories requesting samples | 73 | 21 | 2 | 1 | 9 | 6 | 0 | 112 |
| Laboratories returning data | 33 | 13 | 1 | 1 | 7 | 6 | 0 | 61 |

Participants were instructed to use Method 7 (3) for the analysis and report their results based on Equation 7-4 of the method as mg $NO_x$/DSCM. Under the section called Calculations in Method 7, the analyst was instructed to report the concentration of the $NO_x$ samples as $NO_2$.

Figure 9 is a frequency distribution of the Method 7 audit results. In Audit 0379, Sample #1 (259 mg $NO_x$/DSCM) gave the least trouble to analysts throughout all percentile ranges. None of the samples, though, stand out as giving more trouble to analysts than any other, up to the 80th and 90th percentiles where the problems with the lowest and highest samples (#9 [110 mg $NO_x$/DSCM] and #3 [857 mg $NO_x$/DSCM]) become more pronounced.

In Audit 1079, none of the samples gave more trouble than any others at each of the percentile levels. The 10th to the 70th percentile levels are clustered together with the 80th and 90th percentile level spread out. A slight analytical improvement was shown at the 90th percentile level from Audit 0379 to Audit 1079.

The participant can use these diagrams to locate his placement among others who have analyzed similar samples. Appendix C contains all the reported Method 7 data used to develop the summary statistics.

Examining previous Method 7 audit data for trends using two different sample concentration ranges (Figure 10), we find no difference in the degree of accuracy at the 5% level between either of the sample concentration ranges ($\overline{X}$ = 37% at both levels). With the Method 7 audits, analysts did equally well whether the sample concentration was low or high.

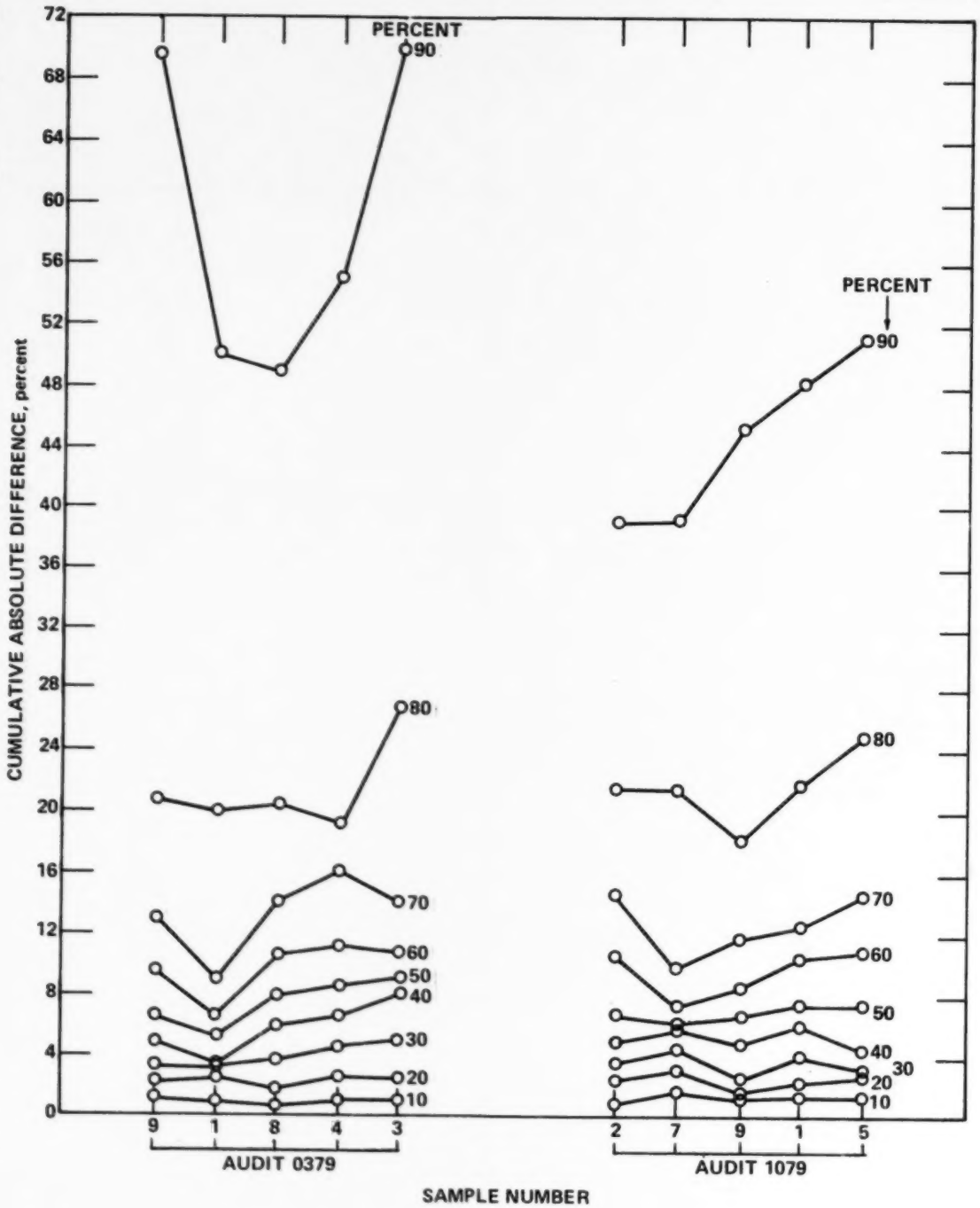


Figure 9. Method 7 audits 0379 and 1079 cumulative frequency distribution.

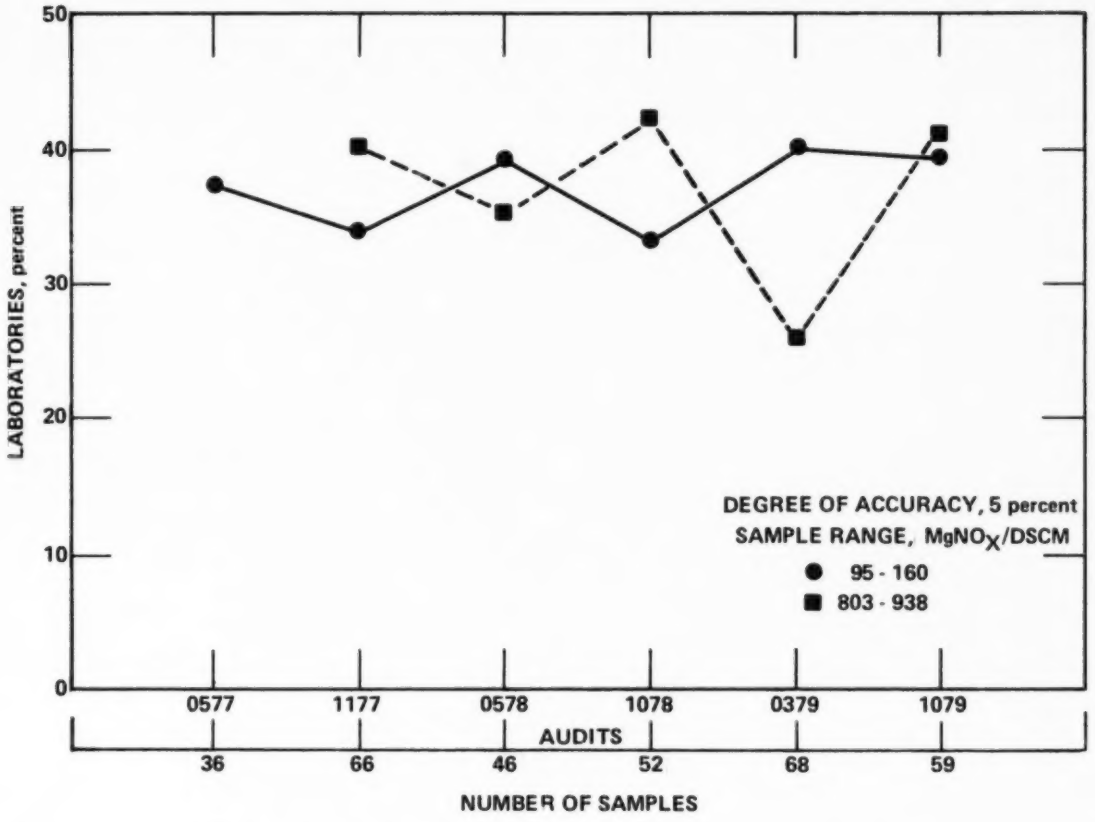


Figure 10. Previous results of method 6 audit.

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## REFERENCES

1. Fuerst, R. G., R. L. Denny, and M. R. Midgett. A Summary of the Interlaboratory Source Performance Surveys for EPA Reference Methods 6 and 7 - 1977. EPA-600/4-79-045, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, August 1979. 50 pp.
2. Fuerst, R. G. and M. R. Midgett. A Summary of the Interlaboratory Source Performance Surveys for EPA Reference Methods 5, 6, and 7 - 1978. EPA-600/4-80-029, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, May 1980. 48 pp.
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# APPENDIX A: METHOD 5 DGM SUMMARY DATA

Interlaboratory Study 0379
Pollutant: DGM
Units: Percent Difference
(Data in Ascending Order)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| -93.6 | -7.9 | -5.6 | -4.6 | -3.7 | -2.5 | -1.4 | -.2 | .6 | 2.9 |
| -93.0 | -7.8 | -5.6 | -4.6 | -3.7 | -2.4 | -1.4 | -.2 | .6 | 2.9 |
| -93.5 | -7.8 | -5.6 | -4.6 | -3.7 | -2.4 | -1.4 | -.2 | .7 | 3.1 |
| -51.3 | -7.8 | -5.5 | -4.6 | -3.6 | -2.4 | -1.3 | -.2 | .7 | 3.2 |
| -51.0 | -7.8 | -5.5 | -4.5 | -3.5 | -2.4 | -1.3 | -.6 | .8 | 3.2 |
| -50.8 | -7.8 | -5.4 | -4.5 | -3.5 | -2.3 | -1.3 | -.6 | .8 | 3.3 |
| -49.7 | -7.8 | -5.4 | -4.5 | -3.4 | -2.3 | -1.3 | -.6 | .8 | 3.3 |
| -44.3 | -7.5 | -5.4 | -4.5 | -3.4 | -2.3 | -1.3 | -.5 | .8 | 3.4 |
| -41.1 | -7.5 | -5.4 | -4.4 | -3.4 | -2.3 | -1.3 | -.5 | .8 | 3.4 |
| -18.2 | -7.4 | -5.3 | -4.4 | -3.4 | -2.2 | -1.3 | -.4 | .9 | 3.6 |
| -14.2 | -7.2 | -5.3 | -4.4 | -3.3 | -2.2 | -1.3 | -.3 | .9 | 3.7 |
| -12.0 | -7.2 | -5.3 | -4.4 | -3.2 | -2.1 | -1.3 | -.2 | .9 | 4.8 |
| -11.7 | -6.6 | -5.2 | -4.3 | -3.2 | -2.1 | -1.2 | -.2 | .9 | 4.8 |
| -11.4 | -6.4 | -5.2 | -4.3 | -3.2 | -2.1 | -1.2 | -.1 | 1.0 | 4.8 |
| -11.3 | -6.4 | -5.1 | -4.2 | -3.2 | -2.1 | -1.2 | -.0 | 1.0 | 7.5 |
| -11.3 | -6.3 | -5.1 | -4.1 | -3.1 | -2.0 | -1.2 | -.0 | 1.0 | 11.3 |
| -11.1 | -6.2 | -5.1 | -4.1 | -3.1 | -2.0 | -1.2 | .1 | 1.0 | 11.5 |
| -11.0 | -6.2 | -5.1 | -4.1 | -3.1 | -2.0 | -1.2 | .1 | 1.2 | 11.8 |
| -10.8 | -6.1 | -5.1 | -4.0 | -3.1 | -2.0 | -1.2 | .1 | 1.4 | 11.8 |
| -10.8 | -6.1 | -5.1 | -4.0 | -3.1 | -2.0 | -1.2 | .2 | 1.5 | 11.9 |
| -9.6 | -6.1 | -5.0 | -4.0 | -3.0 | -2.0 | -1.2 | .2 | 1.7 | 12.7 |
| -9.3 | -6.1 | -4.6 | -4.0 | -3.0 | -1.9 | -1.2 | .2 | 1.7 | 41.8 |
| -8.9 | -6.1 | -4.6 | -4.0 | -3.0 | -1.9 | -1.1 | .2 | 1.7 | 42.1 |
| -8.6 | -5.9 | -4.6 | -4.0 | -3.0 | -1.8 | -1.1 | .3 | 1.9 | 42.6 |
| -8.5 | -5.9 | -4.6 | -3.9 | -3.0 | -1.8 | -1.1 | .3 | 1.9 | 346.9 |
| -8.5 | -5.9 | -4.8 | -3.9 | -3.0 | -1.8 | -1.1 | .3 | 1.9 | 349.4 |
| -8.4 | -5.8 | -4.8 | -3.9 | -2.9 | -1.7 | -1.0 | .3 | 2.0 | 353.7 |
| -8.3 | -5.8 | -4.8 | -3.9 | -2.9 | -1.7 | -1.0 | .4 | 2.2 | |
| -8.3 | -5.8 | -4.8 | -3.8 | -2.9 | -1.7 | -1.0 | .4 | 2.2 | |
| -8.3 | -5.8 | -4.8 | -3.8 | -2.9 | -1.7 | -1.0 | .5 | 2.3 | |
| -8.3 | -5.8 | -4.8 | -3.8 | -2.8 | -1.6 | -.9 | .5 | 2.4 | |
| -8.3 | -5.8 | -4.8 | -3.8 | -2.8 | -1.6 | -.9 | .5 | 2.4 | |
| -8.2 | -5.7 | -4.8 | -3.8 | -2.7 | -1.5 | -.9 | .5 | 2.4 | |
| -8.2 | -5.7 | -4.7 | -3.8 | -2.6 | -1.5 | -.9 | .5 | 2.7 | |
| -8.1 | -5.7 | -4.7 | -3.7 | -2.5 | -1.5 | -.9 | .5 | 2.7 | |

## DATA SUMMARY

| #SAMP | MIN | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | MAX | MEAN | STDEV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 342 | -93.6 | -8.2 | -5.7 | -4.8 | -3.8 | -2.8 | -1.7 | -1.0 | .4 | 2.0 | 353.7 | -.7 | 35.1 |
| SKEWNESS = | 8.55 | MEDIAN = | | -2.8 | | | | | | | | | |

## DATA SUMMARY (OUTLIERS REMOVED)

| #SAMP | MIN | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | MAX | MEAN | STDEV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 319 | -12.3 | -7.8 | -5.5 | -4.6 | -3.8 | -2.9 | -1.7 | -1.1 | .2 | 1.2 | 7.5 | -2.8 | 3.4 |
| SKEWNESS = | .01 | MEDIAN = | | -2.8 | | | | | | | | | |

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Interlaboratory Study 1079
Pollutant: DGM
Units: Percent Difference
(Data in Ascending Order)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| -63.0 | -6.5 | -4.4 | -3.4 | -2.5 | -1.8 | -1.2 | -.4 | .9 | 2.6 |
| -60.2 | -6.4 | -4.4 | -3.4 | -2.5 | -1.8 | -1.2 | -.4 | .9 | 2.6 |
| -55.8 | -6.4 | -4.3 | -3.4 | -2.5 | -1.8 | -1.1 | -.3 | .9 | 2.7 |
| -53.5 | -6.3 | -4.3 | -3.4 | -2.5 | -1.8 | -1.1 | -.3 | 1.0 | 2.8 |
| -53.4 | -6.3 | -4.3 | -3.3 | -2.5 | -1.8 | -1.1 | -.3 | 1.0 | 2.8 |
| -51.8 | -6.1 | -4.3 | -3.3 | -2.5 | -1.8 | -1.1 | -.3 | 1.0 | 3.1 |
| -35.4 | -6.1 | -4.3 | -3.3 | -2.5 | -1.8 | -1.1 | -.3 | 1.0 | 3.5 |
| -35.1 | -6.1 | -4.3 | -3.3 | -2.4 | -1.8 | -1.1 | -.3 | 1.0 | 3.7 |
| -34.9 | -6.1 | -4.2 | -3.3 | -2.4 | -1.8 | -1.1 | -.3 | 1.0 | 3.7 |
| -28.5 | -6.0 | -4.2 | -3.3 | -2.4 | -1.8 | -1.1 | -.3 | 1.0 | 3.7 |
| -28.4 | -5.9 | -4.2 | -3.2 | -2.4 | -1.8 | -1.1 | -.2 | 1.0 | 4.1 |
| -26.7 | -5.9 | -4.2 | -3.2 | -2.4 | -1.8 | -1.1 | -.2 | 1.1 | 4.3 |
| -16.1 | -5.9 | -4.2 | -3.2 | -2.3 | -1.8 | -1.1 | -.2 | 1.1 | 4.9 |
| -15.3 | -5.9 | -4.1 | -3.2 | -2.3 | -1.8 | -1.1 | -.2 | 1.1 | 5.0 |
| -15.3 | -5.7 | -4.1 | -3.1 | -2.2 | -1.8 | -1.1 | -.2 | 1.2 | 5.1 |
| -11.4 | -5.7 | -4.1 | -3.1 | -2.2 | -1.7 | -1.1 | -.2 | 1.2 | 5.1 |
| -10.4 | -5.5 | -4.1 | -3.1 | -2.2 | -1.7 | -1.0 | -.2 | 1.2 | 5.3 |
| -10.3 | -5.4 | -4.1 | -3.0 | -2.2 | -1.7 | -1.0 | -.2 | 1.2 | 5.6 |
| -10.3 | -5.4 | -4.1 | -3.0 | -2.2 | -1.7 | -1.0 | -.2 | 1.2 | 5.7 |
| -10.3 | -5.3 | -4.0 | -2.9 | -2.2 | -1.7 | -.9 | -.2 | 1.2 | 5.8 |
| -10.2 | -5.2 | -4.0 | -2.9 | -2.1 | -1.7 | -.9 | -.1 | 1.3 | 5.9 |
| -9.8 | -5.2 | -4.0 | -2.9 | -2.1 | -1.6 | -.9 | -.1 | 1.3 | 6.0 |
| -9.8 | -5.2 | -4.0 | -2.9 | -2.1 | -1.6 | -.9 | .0 | 1.3 | 6.3 |
| -9.4 | -5.2 | -4.0 | -2.9 | -2.1 | -1.6 | -.8 | .0 | 1.3 | 6.3 |
| -9.4 | -5.1 | -4.0 | -2.9 | -2.1 | -1.6 | -.8 | .0 | 1.3 | 6.5 |
| -9.3 | -5.1 | -4.0 | -2.8 | -2.1 | -1.6 | -.8 | .1 | 1.4 | 6.5 |
| -9.3 | -5.0 | -4.0 | -2.8 | -2.1 | -1.6 | -.8 | .1 | 1.4 | 6.9 |
| -8.9 | -5.0 | -4.0 | -2.8 | -2.0 | -1.6 | -.8 | .1 | 1.4 | 7.1 |
| -8.8 | -5.0 | -4.0 | -2.7 | -2.0 | -1.6 | -.8 | .2 | 1.4 | 7.1 |
| -8.7 | -5.0 | -3.9 | -2.7 | -2.0 | -1.6 | -.8 | .2 | 1.5 | 7.4 |
| -8.6 | -5.0 | -3.9 | -2.7 | -2.0 | -1.6 | -.8 | .2 | 1.6 | 7.5 |
| -8.5 | -5.0 | -3.8 | -2.6 | -2.0 | -1.5 | -.8 | .2 | 1.6 | 7.6 |
| -8.3 | -4.9 | -3.8 | -2.6 | -1.9 | -1.5 | -.7 | .2 | 1.7 | 7.7 |
| -8.2 | -4.8 | -3.8 | -2.6 | -1.9 | -1.5 | -.7 | .4 | 1.7 | 7.8 |
| -8.1 | -4.7 | -3.8 | -2.6 | -1.9 | -1.5 | -.7 | .4 | 1.8 | 7.9 |
| -8.0 | -4.7 | -3.8 | -2.6 | -1.9 | -1.5 | -.7 | .4 | 1.8 | 8.0 |
| -8.0 | -4.7 | -3.7 | -2.6 | -1.9 | -1.4 | -.7 | .4 | 1.9 | 8.0 |
| -7.8 | -4.7 | -3.7 | -2.6 | -1.9 | -1.4 | -.7 | .4 | 1.9 | 8.1 |
| -7.7 | -4.6 | -3.7 | -2.6 | -1.9 | -1.4 | -.6 | .4 | 1.9 | 8.2 |
| -7.7 | -4.6 | -3.7 | -2.6 | -1.9 | -1.4 | -.6 | .5 | 2.0 | 9.2 |
| -7.6 | -4.6 | -3.7 | -2.6 | -1.9 | -1.4 | -.5 | .5 | 2.0 | 9.7 |
| -7.6 | -4.6 | -3.7 | -2.6 | -1.9 | -1.4 | -.5 | .5 | 2.1 | 9.9 |
| -7.5 | -4.6 | -3.6 | -2.6 | -1.9 | -1.3 | -.5 | .5 | 2.1 | 9.9 |
| -7.4 | -4.5 | -3.6 | -2.6 | -1.9 | -1.3 | -.5 | .5 | 2.2 | 13.3 |
| -7.4 | -4.5 | -3.6 | -2.6 | -1.9 | -1.3 | -.5 | .6 | 2.2 | 17.8 |
| -7.2 | -4.5 | -3.5 | -2.6 | -1.9 | -1.3 | -.5 | .6 | 2.3 | 23.3 |
| -7.2 | -4.4 | -3.5 | -2.6 | -1.9 | -1.3 | -.4 | .6 | 2.3 | |
| -7.2 | -4.4 | -3.5 | -2.6 | -1.8 | -1.3 | -.4 | .7 | 2.3 | |
| -7.1 | -4.4 | -3.5 | -2.6 | -1.8 | -1.3 | -.4 | .7 | 2.4 | |
| -6.8 | -4.4 | -3.5 | -2.6 | -1.8 | -1.3 | -.4 | .7 | 2.4 | |
| -6.8 | -4.4 | -3.4 | -2.5 | -1.8 | -1.2 | -.4 | .8 | 2.5 | |
| -6.7 | -4.4 | -3.4 | -2.5 | -1.8 | -1.2 | -.4 | .8 | 2.6 | |

DATA SUMMARY

| #SAMP | MIN | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | MAX | MEAN | STDEV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 523 | -63.0 | -6.0 | -4.4 | -3.5 | -2.6 | -1.8 | -1.3 | -.4 | .6 | 2.3 | 23.3 | -2.6 | 7.7 |
| SKEWNESS = -4.31 | | MEDIAN = | | -1.8 | | | | | | | | | |

DATA SUMMARY (OUTLIERS REMOVED)

| #SAMP | MIN | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | MAX | MEAN | STDEV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 505 | -11.4 | -5.9 | -4.2 | -3.3 | -2.5 | -1.8 | -1.2 | -.4 | .6 | 2.2 | 9.9 | -1.7 | 3.6 |
| SKEWNESS = .07 | | MEDIAN = | | -1.8 | | | | | | | | | |

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# APPENDIX B: METHOD 6 $SO_2$ DATA SUMMARY

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1

| | | | | | |
|---|---|---|---|---|---|
| N | 82 | RANGE | 2469.70 | C.I.(UPPER) | 2609.34 |
| TRUE-VALUE | 1258.30 | VARIANCE | 130091C6.50 | C.I.(LOWE R) | 1047.98 |
| MEAN | 1828.66 | STD. DEV. | 3606.81 | SKEWNESS | 6.04 |
| MEDIAN | 1253.15 | COEF. VAR. | 197.24 | ACCURACY | -.41 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 557.40 | 1225.70 | 1250.00 | 1261.40 | 1277.00 |
| 1128.10 | 1227.90 | 1250.60 | 1262.00 | 1285.00 |
| 1168.20 | 1229.40 | 1250.70 | 1262.40 | 1300.30 |
| 1170.70 | 1229.50 | 1250.80 | 1263.20 | 1308.80 |
| 1172.30 | 1230.00 | 1252.20 | 1264.40 | 1316.60 |
| 1177.70 | 1231.30 | 1252.60 | 1264.60 | 1321.60 |
| 1188.40 | 1232.90 | 1253.10 | 1265.20 | 1346.60 |
| 1197.80 | 1237.30 | 1253.20 | 1265.60 | 1374.10 |
| 1200.40 | 1237.60 | 1253.90 | 1266.00 | 1378.00 |
| 1205.00 | 1240.00 | 1254.00 | 1266.20 | 1393.30 |
| 1205.80 | 1241.70 | 1256.00 | 1266.70 | 1586.20 |
| 1215.10 | 1245.20 | 1256.40 | 1267.00 | 2530.00 |
| 1216.30 | 1247.10 | 1257.20 | 1268.00 | 23762.00 |
| 1216.80 | 1247.70 | 1260.00 | 1269.00 | 25167.10 |
| 1220.20 | 1248.30 | 1260.00 | 1271.00 | |
| 1224.00 | 1249.10 | 1261.00 | 1271.40 | |
| 1225.00 | 1249.60 | 1261.00 | 1277.00 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 80 | RANGE | 1972.60 | C.I.(UPPER) | 1300.67 |
| TRUE-VALUE | 1258.30 | VARIANCE | 29924.10 | C.I.(LOWE R) | 1224.85 |
| MEAN | 1262.76 | STD. DEV. | 172.99 | SKEWNESS | 4.15 |
| MEDIAN | 1252.85 | COEF. VAR. | 13.70 | ACCURACY | -.43 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 557.40 | 1225.70 | 1250.00 | 1261.40 | 1277.00 |
| 1128.10 | 1227.90 | 1250.60 | 1262.00 | 1285.00 |
| 1168.20 | 1229.40 | 1250.70 | 1262.40 | 1300.30 |
| 1170.70 | 1229.50 | 1250.80 | 1263.20 | 1308.80 |
| 1172.30 | 1230.00 | 1252.20 | 1264.40 | 1316.60 |
| 1177.70 | 1231.30 | 1252.60 | 1264.60 | 1321.60 |
| 1188.40 | 1232.90 | 1253.10 | 1265.20 | 1346.60 |
| 1197.80 | 1237.30 | 1253.20 | 1265.60 | 1374.10 |
| 1200.40 | 1237.60 | 1253.90 | 1266.00 | 1378.00 |
| 1205.00 | 1240.00 | 1254.00 | 1266.20 | 1393.30 |
| 1205.80 | 1241.70 | 1256.00 | 1266.70 | 1586.20 |
| 1215.10 | 1245.20 | 1256.40 | 1267.00 | 2530.00 |
| 1216.30 | 1247.10 | 1257.20 | 1268.00 | |
| 1216.80 | 1247.70 | 1260.00 | 1269.00 | |
| 1220.20 | 1248.30 | 1260.00 | 1271.00 | |
| 1224.00 | 1249.10 | 1261.00 | 1271.40 | |
| 1225.00 | 1249.60 | 1261.00 | 1277.00 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3

| | | | | | |
|---|---|---|---|---|---|
| N | 83 | RANGE | 4473.20 | C.I.(UPPER) | 476.93 |
| TRUE-VALUE | 228.78 | VARIANCE | 432817.31 | C.I.(LOWER) | 193.86 |
| MEAN | 335.40 | STD. DEV. | 657.89 | SKEWNESS | 6.07 |
| MEDIAN | 231.80 | COEF. VAR. | 196.15 | ACCURACY | 1.32 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 98.40 | 224.60 | 228.80 | 233.80 | 243.80 |
| 155.40 | 224.80 | 228.80 | 234.00 | 244.00 |
| 193.00 | 224.80 | 229.00 | 234.50 | 244.10 |
| 207.40 | 224.80 | 229.90 | 234.80 | 244.70 |
| 214.70 | 225.00 | 230.00 | 235.80 | 247.10 |
| 217.40 | 225.00 | 231.00 | 236.10 | 247.60 |
| 219.40 | 225.00 | 231.70 | 236.40 | 249.80 |
| 219.80 | 225.00 | 231.80 | 237.00 | 252.00 |
| 220.10 | 225.20 | 232.00 | 237.10 | 254.00 |
| 220.30 | 225.40 | 232.00 | 237.80 | 257.90 |
| 222.20 | 225.50 | 232.30 | 237.90 | 272.40 |
| 223.30 | 225.80 | 232.60 | 238.40 | 289.50 |
| 223.40 | 225.90 | 232.60 | 239.00 | 464.00 |
| 224.00 | 227.00 | 233.00 | 240.70 | 4410.00 |
| 224.20 | 227.30 | 233.20 | 241.20 | 4571.60 |
| 224.30 | 227.80 | 233.40 | 242.70 | |
| 224.50 | 228.60 | 233.50 | 243.30 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 81 | RANGE | 365.60 | C.I.(UPPER) | 240.12 |
| TRUE-VALUE | 228.78 | VARIANCE | 1131.17 | C.I.(LOWER) | 225.47 |
| MEAN | 232.79 | STD. DEV. | 33.63 | SKEWNESS | 3.13 |
| MEDIAN | 231.70 | COEF. VAR. | 14.45 | ACCURACY | 1.28 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 98.40 | 224.60 | 228.80 | 233.80 | 243.80 |
| 155.40 | 224.80 | 228.80 | 234.00 | 244.00 |
| 193.00 | 224.80 | 229.00 | 234.50 | 244.10 |
| 207.40 | 224.80 | 229.90 | 234.80 | 244.70 |
| 214.70 | 225.00 | 230.00 | 235.80 | 247.10 |
| 217.40 | 225.00 | 231.00 | 236.10 | 247.60 |
| 219.40 | 225.00 | 231.70 | 236.40 | 249.80 |
| 219.80 | 225.00 | 231.80 | 237.00 | 252.00 |
| 220.10 | 225.20 | 232.00 | 237.10 | 254.00 |
| 220.30 | 225.40 | 232.00 | 237.80 | 257.90 |
| 222.20 | 225.50 | 232.30 | 237.90 | 272.40 |
| 223.30 | 225.80 | 232.60 | 238.40 | 289.50 |
| 223.40 | 225.90 | 232.60 | 239.00 | 464.00 |
| 224.00 | 227.00 | 233.00 | 240.70 | |
| 224.20 | 227.30 | 233.20 | 241.20 | |
| 224.30 | 227.80 | 233.40 | 242.70 | |
| 224.50 | 228.60 | 233.50 | 243.30 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 5

| | | | | | |
|---|---|---|---|---|---|
| N | 83 | RANGE | 36482.40 | C.I.(UPPER) | 3906.15 |
| TRUE-VALUE | 1868.40 | VARIANCE | 2910492.00 | C.I.(LOWER) | 1584.86 |
| MEAN | 2745.50 | STD. DEV. | 5394.88 | SKEWNESS | 6.08 |
| MEDIAN | 1877.50 | COEF. VAR. | 196.50 | ACCURACY | .49 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1229.70 | 1839.90 | 1870.50 | 1889.00 | 1952.30 |
| 1725.90 | 1847.00 | 1872.20 | 1890.00 | 1958.00 |
| 1764.40 | 1849.20 | 1873.10 | 1890.50 | 1969.60 |
| 1770.50 | 1850.00 | 1873.40 | 1891.30 | 1970.90 |
| 1774.20 | 1851.70 | 1873.60 | 1892.20 | 1975.00 |
| 1775.00 | 1853.80 | 1874.20 | 1892.30 | 2008.00 |
| 1787.20 | 1854.20 | 1876.00 | 1893.70 | 2027.50 |
| 1795.40 | 1856.80 | 1877.50 | 1894.30 | 2034.40 |
| 1820.00 | 1857.20 | 1879.10 | 1894.80 | 2053.50 |
| 1822.40 | 1857.70 | 1879.50 | 1900.00 | 2064.90 |
| 1826.40 | 1859.10 | 1880.00 | 1900.00 | 2084.00 |
| 1835.20 | 1859.90 | 1881.80 | 1901.20 | 2359.50 |
| 1836.50 | 1861.50 | 1883.60 | 1904.80 | 3780.00 |
| 1837.00 | 1862.00 | 1886.70 | 1922.00 | 35942.00 |
| 1837.90 | 1866.00 | 1887.20 | 1929.00 | 37712.10 |
| 1838.00 | 1868.20 | 1887.60 | 1929.40 | |
| 1838.10 | 1868.70 | 1888.90 | 1949.10 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 5 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 81 | RANGE | 2550.30 | C.I.(UPPER) | 1955.94 |
| TRUE-VALUE | 1868.40 | VARIANCE | 56925.90 | C.I.(LOWER) | 1852.03 |
| MEAN | 1903.98 | STD. DEV. | 238.59 | SKEWNESS | 5.81 |
| MEDIAN | 1876.00 | COEF. VAR. | 12.53 | ACCURACY | .41 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1229.70 | 1839.90 | 1870.50 | 1889.00 | 1952.30 |
| 1725.90 | 1847.00 | 1872.20 | 1890.00 | 1958.00 |
| 1764.40 | 1849.20 | 1873.10 | 1890.50 | 1969.60 |
| 1770.50 | 1850.00 | 1873.40 | 1891.30 | 1970.90 |
| 1774.20 | 1851.70 | 1873.60 | 1892.20 | 1975.00 |
| 1775.00 | 1853.80 | 1874.20 | 1892.30 | 2008.00 |
| 1787.20 | 1854.20 | 1876.00 | 1893.70 | 2027.50 |
| 1795.40 | 1856.80 | 1877.50 | 1894.30 | 2034.40 |
| 1820.00 | 1857.20 | 1879.10 | 1894.80 | 2053.50 |
| 1822.40 | 1857.70 | 1879.50 | 1900.00 | 2064.90 |
| 1826.40 | 1859.10 | 1880.00 | 1900.00 | 2084.00 |
| 1835.20 | 1859.90 | 1881.80 | 1901.20 | 2359.50 |
| 1836.50 | 1861.50 | 1883.60 | 1904.80 | 3780.00 |
| 1837.00 | 1862.00 | 1886.70 | 1922.00 | |
| 1837.90 | 1866.00 | 1887.20 | 1929.00 | |
| 1838.00 | 1868.20 | 1887.60 | 1929.40 | |
| 1838.10 | 1868.70 | 1888.90 | 1949.10 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 7

| | | | | | |
|---|---|---|---|---|---|
| N | 83 | RANGE | 46993.30 | C.I.(UPPER) | 4956.85 |
| TRUE-VALUE | 2402.20 | VARIANCE | 469403 95.00 | C.I.(LOWE R) | 2008.90 |
| MEAN | 3482.88 | STD. DEV. | 6851.31 | SKEWNESS | 6.08 |
| MEDIAN | 2397.70 | COEF. VAR. | 196.71 | ACCURACY | -.19 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1016.50 | 2357.00 | 2382.90 | 2409.00 | 2448.00 |
| 1821.40 | 2357.40 | 2389.00 | 2409.50 | 2459.40 |
| 2262.70 | 2358.60 | 2390.00 | 2410.60 | 2466.30 |
| 2268.90 | 2360.40 | 2390.80 | 2411.00 | 2492.00 |
| 2270.10 | 2361.10 | 2391.00 | 2414.00 | 2515.20 |
| 2277.00 | 2361.80 | 2391.60 | 2414.00 | 2528.30 |
| 2302.70 | 2362.30 | 2394.80 | 2414.50 | 2533.40 |
| 2312.90 | 2362.80 | 2397.70 | 2415.00 | 2565.60 |
| 2315.40 | 2366.30 | 2398.30 | 2417.50 | 2575.20 |
| 2328.00 | 2366.50 | 2399.90 | 2418.40 | 2639.00 |
| 2349.00 | 2367.20 | 2400.70 | 2422.80 | 2648.90 |
| 2351.80 | 2367.70 | 2401.50 | 2423.80 | 3083.30 |
| 2352.10 | 2370.00 | 2402.10 | 2426.00 | 4830.00 |
| 2354.70 | 2373.30 | 2404.60 | 2430.00 | 45495.00 |
| 2355.10 | 2375.70 | 2406.20 | 2434.10 | 48009.80 |
| 2356.50 | 2378.50 | 2406.80 | 2441.70 | |
| 2356.70 | 2380.40 | 2408.00 | 2443.00 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 7 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 81 | RANGE | 3813.50 | C.I.(UPPER) | 2487.50 |
| TRUE-VALUE | 2402.20 | VARIANCE | 112374.95 | C.I.(LOWE R) | 2341.49 |
| MEAN | 2414.49 | STD. DEV. | 335.22 | SKEWNESS | 3.76 |
| MEDIAN | 2394.80 | COEF. VAR. | 13.88 | ACCURACY | -.31 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1016.50 | 2357.00 | 2382.90 | 2409.00 | 2448.00 |
| 1821.40 | 2357.40 | 2389.00 | 2409.50 | 2459.40 |
| 2262.70 | 2358.60 | 2390.00 | 2410.60 | 2466.30 |
| 2268.90 | 2360.40 | 2390.80 | 2411.00 | 2492.00 |
| 2270.10 | 2361.10 | 2391.00 | 2414.00 | 2515.20 |
| 2277.00 | 2361.80 | 2391.60 | 2414.00 | 2528.30 |
| 2302.70 | 2362.30 | 2394.80 | 2414.50 | 2533.40 |
| 2312.90 | 2362.80 | 2397.70 | 2415.00 | 2565.60 |
| 2315.40 | 2366.30 | 2398.30 | 2417.50 | 2575.20 |
| 2328.00 | 2366.50 | 2399.90 | 2418.40 | 2639.00 |
| 2349.00 | 2367.20 | 2400.70 | 2422.80 | 2648.90 |
| 2351.80 | 2367.70 | 2401.50 | 2423.80 | 3083.30 |
| 2352.10 | 2370.00 | 2402.10 | 2426.00 | 4830.00 |
| 2354.70 | 2373.30 | 2404.60 | 2430.00 | |
| 2355.10 | 2375.70 | 2406.20 | 2434.10 | |
| 2356.50 | 2378.50 | 2406.80 | 2441.70 | |
| 2356.70 | 2380.40 | 2408.00 | 2443.00 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9

| | | | | | |
|---|---|---|---|---|---|
| N | 83 | RANGE | 12544.40 | C.I.(UPPER) | 1340.26 |
| TRUE-VALUE | 648.20 | VARIANCE | 3374451.37 | C.I.(LOWER) | 549.86 |
| MEAN | 945.06 | STD. DEV. | 1836.97 | SKEWNESS | 6.07 |
| MEDIAN | 645.30 | COEF. VAR. | 194.38 | ACCURACY | -.45 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 262.30 | 632.30 | 642.20 | 654.20 | 672.00 |
| 565.90 | 633.00 | 642.30 | 654.60 | 672.00 |
| 572.00 | 634.20 | 642.60 | 654.90 | 674.20 |
| 587.20 | 635.70 | 642.80 | 655.90 | 675.00 |
| 605.00 | 636.00 | 644.30 | 655.90 | 675.30 |
| 614.90 | 636.00 | 644.40 | 655.90 | 691.80 |
| 619.80 | 636.20 | 645.20 | 658.10 | 701.50 |
| 621.60 | 637.40 | 645.30 | 658.60 | 705.00 |
| 622.90 | 638.50 | 647.00 | 658.70 | 706.00 |
| 626.40 | 638.70 | 650.00 | 658.70 | 711.80 |
| 626.40 | 638.90 | 650.00 | 659.70 | 793.10 |
| 627.30 | 639.30 | 650.50 | 660.60 | 1244.20 |
| 627.80 | 639.30 | 651.00 | 660.80 | 1290.00 |
| 628.30 | 639.60 | 652.00 | 661.20 | 12276.00 |
| 628.80 | 640.60 | 652.00 | 661.90 | 12806.70 |
| 631.20 | 640.60 | 653.40 | 662.00 | |
| 632.00 | 640.90 | 654.00 | 667.80 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 81 | RANGE | 1027.70 | C.I.(UPPER) | 682.78 |
| TRUE-VALUE | 648.20 | VARIANCE | 12196.10 | C.I.(LOWER) | 634.68 |
| MEAN | 658.73 | STD. DEV. | 110.44 | SKEWNESS | 3.58 |
| MEDIAN | 645.20 | COEF. VAR. | 16.76 | ACCURACY | -.46 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 262.30 | 632.30 | 642.20 | 654.20 | 672.00 |
| 565.90 | 633.00 | 642.30 | 654.60 | 672.00 |
| 572.00 | 634.20 | 642.60 | 654.90 | 674.20 |
| 587.20 | 635.70 | 642.80 | 655.90 | 675.00 |
| 605.00 | 636.00 | 644.30 | 655.90 | 675.30 |
| 614.90 | 636.00 | 644.40 | 655.90 | 691.80 |
| 619.80 | 636.20 | 645.20 | 658.10 | 701.50 |
| 621.60 | 637.40 | 645.30 | 658.60 | 705.00 |
| 622.90 | 638.50 | 647.00 | 658.70 | 706.00 |
| 626.40 | 638.70 | 650.00 | 658.70 | 711.80 |
| 626.40 | 638.90 | 650.00 | 659.70 | 793.10 |
| 627.30 | 639.30 | 650.50 | 660.60 | 1244.20 |
| 627.80 | 639.30 | 651.00 | 660.80 | 1290.00 |
| 628.30 | 639.60 | 652.00 | 661.20 | |
| 628.80 | 640.60 | 652.00 | 661.90 | |
| 631.20 | 640.60 | 653.40 | 662.00 | |
| 632.00 | 640.90 | 654.00 | 667.80 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 2

| | | | | | |
|---|---|---|---|---|---|
| N | 92 | RANGE | 2229.90 | C.I.(UPPER) | 731.50 |
| TRUE-VALUE | 648.00 | VARIANCE | 62656.82 | C.I.(LOWER) | 629.20 |
| MEAN | 680.35 | STD. DEV. | 250.31 | SKEWNESS | 7.29 |
| MEDIAN | 642.85 | COEF. VAR. | 36.79 | ACCURACY | -.79 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 566.50 | 631.60 | 639.70 | 647.80 | 667.00 |
| 574.00 | 633.30 | 640.00 | 648.10 | 668.00 |
| 583.90 | 633.50 | 640.20 | 649.60 | 669.10 |
| 587.20 | 633.60 | 641.00 | 649.80 | 669.70 |
| 602.70 | 634.50 | 641.00 | 652.20 | 673.00 |
| 611.90 | 634.90 | 641.60 | 653.10 | 674.20 |
| 617.70 | 635.00 | 641.70 | 653.10 | 675.50 |
| 620.30 | 635.50 | 642.70 | 653.30 | 678.50 |
| 621.90 | 635.70 | 643.00 | 656.10 | 680.00 |
| 622.30 | 636.10 | 643.20 | 657.10 | 686.40 |
| 622.90 | 636.20 | 643.60 | 657.30 | 693.30 |
| 624.60 | 637.00 | 643.60 | 657.40 | 702.10 |
| 627.60 | 637.00 | 643.70 | 657.90 | 730.30 |
| 627.80 | 637.40 | 644.10 | 658.10 | 811.70 |
| 628.10 | 637.40 | 645.10 | 659.50 | 1697.60 |
| 628.50 | 637.90 | 645.50 | 660.30 | 2796.40 |
| 629.00 | 638.10 | 645.70 | 660.70 | |
| 630.30 | 638.70 | 647.00 | 663.30 | |
| 630.80 | 638.70 | 647.60 | 664.40 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 2 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 90 | RANGE | 245.20 | C.I.(UPPER) | 651.74 |
| TRUE-VALUE | 648.00 | VARIANCE | 901.20 | C.I.(LOWER) | 639.33 |
| MEAN | 645.53 | STD. DEV. | 30.02 | SKEWNESS | 1.74 |
| MEDIAN | 642.20 | COEF. VAR. | 4.65 | ACCURACY | -.90 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 566.50 | 631.60 | 639.70 | 647.80 | 667.00 |
| 574.00 | 633.30 | 640.00 | 648.10 | 668.00 |
| 583.90 | 633.50 | 640.20 | 649.60 | 669.10 |
| 587.20 | 633.60 | 641.00 | 649.80 | 669.70 |
| 602.70 | 634.50 | 641.00 | 652.20 | 673.00 |
| 611.90 | 634.90 | 641.60 | 653.10 | 674.20 |
| 617.70 | 635.00 | 641.70 | 653.10 | 675.50 |
| 620.30 | 635.50 | 642.70 | 653.30 | 678.50 |
| 621.90 | 635.70 | 643.00 | 656.10 | 680.00 |
| 622.30 | 636.10 | 643.20 | 657.10 | 686.40 |
| 622.90 | 636.20 | 643.60 | 657.30 | 693.30 |
| 624.60 | 637.00 | 643.60 | 657.40 | 702.10 |
| 627.60 | 637.00 | 643.70 | 657.90 | 730.30 |
| 627.80 | 637.40 | 644.10 | 658.10 | 811.70 |
| 628.10 | 637.40 | 645.10 | 659.50 | |
| 628.50 | 637.90 | 645.50 | 660.30 | |
| 629.00 | 638.10 | 645.70 | 660.70 | |
| 630.30 | 638.70 | 647.00 | 663.30 | |
| 630.80 | 638.70 | 647.60 | 664.40 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3

| | | | | | |
|---|---|---|---|---|---|
| N | 92 | RANGE | 3574.70 | C.I.(UPPER) | 1214.94 |
| TRUE-VALUE | 1068.00 | VARIANCE | 176956.26 | C.I.(LOWER) | 1043.02 |
| MEAN | 1128.98 | STD. DEV. | 420.66 | SKEWNESS | 6.48 |
| MEDIAN | 1057.95 | COEF. VAR. | 37.26 | ACCURACY | -.94 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 932.80 | 1032.10 | 1055.80 | 1067.40 | 1090.50 |
| 965.10 | 1035.10 | 1056.10 | 1070.00 | 1091.30 |
| 976.20 | 1035.90 | 1056.40 | 1070.00 | 1092.60 |
| 999.00 | 1038.10 | 1056.90 | 1070.00 | 1092.60 |
| 1001.50 | 1039.10 | 1057.00 | 1070.90 | 1095.20 |
| 1005.50 | 1043.60 | 1057.00 | 1073.50 | 1097.00 |
| 1006.70 | 1044.70 | 1057.10 | 1073.80 | 1099.00 |
| 1013.00 | 1044.80 | 1057.50 | 1075.50 | 1100.00 |
| 1014.30 | 1046.00 | 1058.40 | 1076.00 | 1116.00 |
| 1016.90 | 1049.90 | 1059.00 | 1078.30 | 1123.70 |
| 1019.20 | 1050.10 | 1059.00 | 1079.20 | 1151.00 |
| 1021.30 | 1050.50 | 1059.10 | 1079.30 | 1204.30 |
| 1021.90 | 1051.00 | 1059.10 | 1079.40 | 1250.50 |
| 1026.80 | 1051.20 | 1060.80 | 1079.60 | 2482.30 |
| 1028.80 | 1052.30 | 1062.70 | 1079.60 | 2634.20 |
| 1029.50 | 1052.60 | 1063.00 | 1079.60 | 4507.50 |
| 1030.00 | 1053.80 | 1064.00 | 1080.80 | |
| 1030.30 | 1054.10 | 1066.10 | 1086.40 | |
| 1031.40 | 1054.50 | 1067.00 | 1087.20 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 89 | RANGE | 317.70 | C.I.(UPPER) | 1067.60 |
| TRUE-VALUE | 1068.00 | VARIANCE | 1753.62 | C.I.(LOWER) | 1050.20 |
| MEAN | 1058.90 | STD. DEV. | 41.88 | SKEWNESS | 1.09 |
| MEDIAN | 1057.10 | COEF. VAR. | 3.95 | ACCURACY | -1.02 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 932.80 | 1031.40 | 1054.10 | 1064.00 | 1079.60 |
| 965.10 | 1032.10 | 1054.50 | 1066.10 | 1080.80 |
| 976.20 | 1035.10 | 1055.80 | 1067.00 | 1086.40 |
| 999.00 | 1035.90 | 1056.10 | 1067.40 | 1087.20 |
| 1001.50 | 1038.10 | 1056.40 | 1070.00 | 1090.50 |
| 1005.50 | 1039.10 | 1056.90 | 1070.00 | 1091.30 |
| 1006.70 | 1043.60 | 1057.00 | 1070.00 | 1092.60 |
| 1013.00 | 1044.70 | 1057.00 | 1070.90 | 1092.60 |
| 1014.30 | 1044.80 | 1057.10 | 1073.50 | 1095.20 |
| 1016.90 | 1046.00 | 1057.50 | 1073.80 | 1097.00 |
| 1019.20 | 1049.90 | 1058.40 | 1075.50 | 1099.00 |
| 1021.30 | 1050.10 | 1059.00 | 1076.00 | 1100.00 |
| 1021.90 | 1050.50 | 1059.00 | 1078.30 | 1116.00 |
| 1026.80 | 1051.00 | 1059.10 | 1079.20 | 1123.70 |
| 1028.80 | 1051.20 | 1059.10 | 1079.30 | 1151.00 |
| 1029.50 | 1052.30 | 1060.80 | 1079.40 | 1204.30 |
| 1030.00 | 1052.60 | 1062.70 | 1079.60 | 1250.50 |
| 1030.30 | 1053.80 | 1063.00 | 1079.60 | |

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INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 4

| | | | | | |
|---|---|---|---|---|---|
| N | 92 | RANGE | 1071.70 | C.I.(UPPER) | 365.23 |
| TRUE-VALUE | 305.00 | VARIANCE | 23312.30 | C.I.(LOWER) | 302.83 |
| MEAN | 334.03 | STD. DEV. | 152.68 | SKEWNESS | 5.86 |
| MEDIAN | 304.85 | COEF. VAR. | 45.71 | ACCURACY | -.05 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 257.50 | 298.50 | 303.40 | 309.50 | 326.20 |
| 265.70 | 298.60 | 303.60 | 309.50 | 327.40 |
| 274.00 | 299.00 | 303.80 | 309.90 | 327.90 |
| 283.00 | 299.00 | 304.00 | 310.20 | 328.40 |
| 285.50 | 299.00 | 304.30 | 310.40 | 328.60 |
| 288.00 | 299.00 | 304.50 | 310.50 | 330.00 |
| 288.30 | 299.10 | 304.50 | 310.70 | 340.80 |
| 289.20 | 300.00 | 304.80 | 311.30 | 341.70 |
| 289.70 | 300.00 | 304.90 | 312.60 | 342.00 |
| 289.80 | 300.00 | 305.20 | 312.60 | 346.50 |
| 291.50 | 301.20 | 305.40 | 313.50 | 354.40 |
| 294.50 | 301.20 | 305.50 | 314.10 | 364.10 |
| 295.50 | 301.70 | 305.50 | 314.20 | 462.50 |
| 295.80 | 301.90 | 307.50 | 315.00 | 631.60 |
| 295.90 | 302.00 | 307.90 | 315.50 | 1302.00 |
| 296.30 | 302.30 | 308.10 | 315.70 | 1329.20 |
| 297.90 | 303.00 | 308.90 | 316.30 | |
| 298.10 | 303.10 | 309.50 | 318.50 | |
| 298.40 | 303.20 | 309.50 | 320.30 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 4 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 90 | RANGE | 374.10 | C.I.(UPPER) | 320.74 |
| TRUE-VALUE | 305.00 | VARIANCE | 1699.67 | C.I.(LOWER) | 303.70 |
| MEAN | 312.22 | STD. DEV. | 41.23 | SKEWNESS | 5.68 |
| MEDIAN | 304.65 | COEF. VAR. | 13.20 | ACCURACY | -.11 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 257.50 | 298.50 | 303.40 | 309.50 | 326.20 |
| 265.70 | 298.60 | 303.60 | 309.50 | 327.40 |
| 274.00 | 299.00 | 303.80 | 309.90 | 327.90 |
| 283.00 | 299.00 | 304.00 | 310.20 | 328.40 |
| 285.50 | 299.00 | 304.30 | 310.40 | 328.60 |
| 288.00 | 299.00 | 304.50 | 310.50 | 330.00 |
| 288.30 | 299.10 | 304.50 | 310.70 | 340.80 |
| 289.20 | 300.00 | 304.80 | 311.30 | 341.70 |
| 289.70 | 300.00 | 304.90 | 312.60 | 342.00 |
| 289.80 | 300.00 | 305.20 | 312.60 | 346.50 |
| 291.50 | 301.20 | 305.40 | 313.50 | 354.40 |
| 294.50 | 301.20 | 305.50 | 314.10 | 364.10 |
| 295.50 | 301.70 | 305.50 | 314.20 | 462.50 |
| 295.80 | 301.90 | 307.50 | 315.00 | 631.60 |
| 295.90 | 302.00 | 307.90 | 315.50 | |
| 296.30 | 302.30 | 308.10 | 315.70 | |
| 297.90 | 303.00 | 308.90 | 316.30 | |
| 298.10 | 303.10 | 309.50 | 318.50 | |
| 298.40 | 303.20 | 309.50 | 320.30 | |

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PAGE NUMBER
EPA-287 (Cont.) (4-76)

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 6

| | | | | | |
|---|---|---|---|---|---|
| N | 92 | RANGE | 17072.40 | C.I.(UPPER) | 2235.78 |
| TRUE-VALUE | 1678.00 | VARIANCE | 2976240.47 | C.I.(LOWER) | 1530.72 |
| MEAN | 1883.25 | STD. DEV. | 1725.18 | SKEWNESS | 8.02 |
| MEDIAN | 1668.90 | COEF. VAR. | 91.61 | ACCURACY | -.54 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 223.80 | 1633.00 | 1663.00 | 1682.90 | 1705.00 |
| 1502.20 | 1638.50 | 1664.30 | 1683.60 | 1708.50 |
| 1507.60 | 1639.00 | 1664.60 | 1684.00 | 1714.50 |
| 1538.50 | 1640.00 | 1667.90 | 1684.60 | 1717.30 |
| 1572.20 | 1646.00 | 1668.00 | 1684.80 | 1724.50 |
| 1591.90 | 1646.60 | 1668.30 | 1685.00 | 1725.30 |
| 1593.00 | 1647.20 | 1668.60 | 1688.10 | 1730.00 |
| 1594.90 | 1648.30 | 1668.80 | 1688.40 | 1738.50 |
| 1595.80 | 1651.00 | 1669.00 | 1689.80 | 1740.00 |
| 1601.20 | 1651.00 | 1670.10 | 1690.00 | 1787.30 |
| 1603.30 | 1653.40 | 1671.00 | 1692.00 | 1792.20 |
| 1612.80 | 1654.20 | 1671.20 | 1693.20 | 1816.10 |
| 1614.30 | 1655.30 | 1672.90 | 1694.20 | 1904.80 |
| 1617.50 | 1657.00 | 1676.00 | 1694.40 | 2004.80 |
| 1619.00 | 1657.10 | 1676.30 | 1694.50 | 6995.10 |
| 1622.90 | 1659.50 | 1679.70 | 1700.80 | 17296.20 |
| 1624.80 | 1660.50 | 1679.80 | 1701.30 | |
| 1627.00 | 1661.50 | 1680.30 | 1704.40 | |
| 1631.80 | 1662.70 | 1682.10 | 1704.90 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 6 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 90 | RANGE | 1781.00 | C.I.(UPPER) | 1689.60 |
| TRUE-VALUE | 1678.00 | VARIANCE | 27721.10 | C.I.(LOWER) | 1620.80 |
| MEAN | 1655.20 | STD. DEV. | 166.50 | SKEWNESS | -6.91 |
| MEDIAN | 1668.70 | COEF. VAR. | 10.06 | ACCURACY | -.55 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 223.80 | 1633.00 | 1663.00 | 1682.90 | 1705.00 |
| 1502.20 | 1638.50 | 1664.30 | 1683.60 | 1708.50 |
| 1507.60 | 1639.00 | 1664.60 | 1684.00 | 1714.50 |
| 1538.50 | 1640.00 | 1667.90 | 1684.60 | 1717.30 |
| 1572.20 | 1646.00 | 1668.00 | 1684.80 | 1724.50 |
| 1591.90 | 1646.60 | 1668.30 | 1685.00 | 1725.30 |
| 1593.00 | 1647.20 | 1668.60 | 1688.10 | 1730.00 |
| 1594.90 | 1648.30 | 1668.80 | 1688.40 | 1738.50 |
| 1595.80 | 1651.00 | 1669.00 | 1689.80 | 1740.00 |
| 1601.20 | 1651.00 | 1670.10 | 1690.00 | 1787.30 |
| 1603.30 | 1653.40 | 1671.00 | 1692.00 | 1792.20 |
| 1612.80 | 1654.20 | 1671.20 | 1693.20 | 1816.10 |
| 1614.30 | 1655.30 | 1672.90 | 1694.20 | 1904.80 |
| 1617.50 | 1657.00 | 1676.00 | 1694.40 | 2004.80 |
| 1619.00 | 1657.10 | 1676.30 | 1694.50 | |
| 1622.90 | 1659.50 | 1679.70 | 1700.80 | |
| 1624.80 | 1660.50 | 1679.80 | 1701.30 | |
| 1627.00 | 1661.50 | 1680.30 | 1704.40 | |
| 1631.80 | 1662.70 | 1682.10 | 1704.90 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9

| | | | | | |
|---|---|---|---|---|---|
| N | 91 | RANGE | 11529.50 | C.I.(UPPER) | 2847.11 |
| TRUE-VALUE | 2440.00 | VARIANCE | 1922622.30 | C.I.(LOWER) | 2277.33 |
| MEAN | 2562.22 | STD. DEV. | 1386.59 | SKEWNESS | 6.69 |
| MEDIAN | 2370.20 | COEF. VAR. | 54.12 | ACCURACY | -2.86 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1763.00 | 2320.60 | 2363.10 | 2389.40 | 2420.60 |
| 2160.30 | 2322.60 | 2364.00 | 2390.90 | 2423.50 |
| 2185.40 | 2322.80 | 2366.80 | 2391.00 | 2424.50 |
| 2188.70 | 2325.70 | 2367.00 | 2394.80 | 2437.40 |
| 2206.00 | 2326.00 | 2369.20 | 2396.60 | 2440.00 |
| 2244.40 | 2326.30 | 2369.70 | 2396.80 | 2440.40 |
| 2250.90 | 2332.30 | 2370.00 | 2398.00 | 2449.60 |
| 2263.30 | 2335.50 | 2370.20 | 2399.50 | 2450.00 |
| 2265.00 | 2337.40 | 2372.90 | 2400.00 | 2455.00 |
| 2273.20 | 2340.00 | 2375.00 | 2400.90 | 2492.50 |
| 2279.50 | 2347.00 | 2377.00 | 2402.30 | 2528.70 |
| 2285.20 | 2347.50 | 2380.00 | 2402.30 | 2592.40 |
| 2290.50 | 2349.20 | 2382.30 | 2402.60 | 2682.00 |
| 2303.70 | 2357.00 | 2382.60 | 2406.10 | 9867.50 |
| 2303.90 | 2357.80 | 2383.10 | 2407.60 | 13292.50 |
| 2306.00 | 2359.10 | 2385.70 | 2409.10 | |
| 2307.70 | 2359.40 | 2387.00 | 2411.40 | |
| 2310.00 | 2361.90 | 2387.00 | 2416.70 | |
| 2313.30 | 2363.00 | 2387.80 | 2418.00 | |

INTER-LABORATORY STUDY 0979

POLLUTANT - SO2 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 89 | RANGE | 919.00 | C.I.(UPPER) | 2380.29 |
| TRUE-VALUE | 2440.00 | VARIANCE | 9944.95 | C.I.(LOWER) | 2338.86 |
| MEAN | 2359.57 | STD. DEV. | 99.72 | SKEWNESS | -2.06 |
| MEDIAN | 2370.00 | COEF. VAR. | 4.23 | ACCURACY | -2.87 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 1763.00 | 2313.30 | 2361.90 | 2387.00 | 2409.10 |
| 2160.30 | 2320.60 | 2363.00 | 2387.00 | 2411.40 |
| 2185.40 | 2322.60 | 2363.10 | 2387.80 | 2416.70 |
| 2188.70 | 2322.80 | 2364.00 | 2389.40 | 2418.00 |
| 2206.00 | 2325.70 | 2366.80 | 2390.90 | 2420.60 |
| 2244.40 | 2326.00 | 2367.00 | 2391.00 | 2423.50 |
| 2250.90 | 2326.30 | 2369.20 | 2394.80 | 2424.50 |
| 2263.30 | 2332.30 | 2369.70 | 2396.60 | 2437.40 |
| 2265.00 | 2335.50 | 2370.00 | 2396.80 | 2440.00 |
| 2273.20 | 2337.40 | 2370.20 | 2398.00 | 2440.40 |
| 2279.50 | 2340.00 | 2372.90 | 2399.50 | 2449.60 |
| 2285.20 | 2347.00 | 2375.00 | 2400.00 | 2450.00 |
| 2290.50 | 2347.50 | 2377.00 | 2400.90 | 2455.00 |
| 2303.70 | 2349.20 | 2380.00 | 2402.30 | 2492.50 |
| 2303.90 | 2357.00 | 2382.30 | 2402.30 | 2528.70 |
| 2306.00 | 2357.80 | 2382.60 | 2402.60 | 2592.40 |
| 2307.70 | 2359.10 | 2383.10 | 2406.10 | 2682.00 |
| 2310.00 | 2359.40 | 2385.70 | 2407.60 | |

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# APPENDIX C: METHOD 7 $NO_x$ DATA SUMMARY

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1

| | | | | | |
|---|---|---|---|---|---|
| N | 68 | RANGE | 606.70 | C.I.(UPPER) | 294.96 |
| TRUE-VALUE | 258.95 | VARIANCE | 8264.76 | C.I.(LOWER) | 251.74 |
| MEAN | 273.35 | STD. DEV. | 90.91 | SKEWNESS | 1.61 |
| MEDIAN | 265.85 | COEF. VAR. | 33.26 | ACCURACY | 2.66 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 41.90 | 248.40 | 262.80 | 268.10 | 294.90 |
| 75.50 | 250.10 | 263.00 | 269.70 | 306.50 |
| 77.50 | 251.00 | 264.90 | 270.30 | 307.40 |
| 132.50 | 252.70 | 265.00 | 272.00 | 310.30 |
| 176.00 | 255.00 | 265.00 | 273.50 | 311.00 |
| 202.10 | 255.00 | 265.70 | 273.50 | 319.40 |
| 221.60 | 257.00 | 266.00 | 273.70 | 341.00 |
| 230.50 | 258.00 | 266.80 | 273.80 | 389.00 |
| 240.00 | 258.10 | 267.00 | 274.50 | 445.00 |
| 241.20 | 259.60 | 267.00 | 276.40 | 521.00 |
| 242.20 | 259.80 | 267.30 | 276.50 | 613.20 |
| 242.70 | 260.00 | 267.50 | 281.00 | 648.60 |
| 245.00 | 262.60 | 267.80 | 282.10 | |
| 245.90 | 262.80 | 268.00 | 287.00 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 65 | RANGE | 403.10 | C.I.(UPPER) | 272.85 |
| TRUE-VALUE | 258.95 | VARIANCE | 3466.26 | C.I.(LOWER) | 244.23 |
| MEAN | 258.54 | STD. DEV. | 58.87 | SKEWNESS | -1.13 |
| MEDIAN | 265.00 | COEF. VAR. | 22.77 | ACCURACY | 2.34 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 41.90 | 248.40 | 262.80 | 268.10 | 294.90 |
| 75.50 | 250.10 | 263.00 | 269.70 | 306.50 |
| 77.50 | 251.00 | 264.90 | 270.30 | 307.40 |
| 132.50 | 252.70 | 265.00 | 272.00 | 310.30 |
| 176.00 | 255.00 | 265.00 | 273.50 | 311.00 |
| 202.10 | 255.00 | 265.70 | 273.50 | 319.40 |
| 221.60 | 257.00 | 266.00 | 273.70 | 341.00 |
| 230.50 | 258.00 | 266.80 | 273.80 | 389.00 |
| 240.00 | 258.10 | 267.00 | 274.50 | 445.00 |
| 241.20 | 259.60 | 267.00 | 276.40 | |
| 242.20 | 259.80 | 267.30 | 276.50 | |
| 242.70 | 260.00 | 267.50 | 281.00 | |
| 245.00 | 262.60 | 267.80 | 282.10 | |
| 245.90 | 262.80 | 268.00 | 287.00 | |

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INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3

| | | | | | |
|---|---|---|---|---|---|
| N | 68 | RANGE | 2093.10 | C.I.(UPPER) | 962.64 |
| TRUE-VALUE | 856.51 | VARIANCE | 101056.15 | C.I.(LOWER) | 811.52 |
| MEAN | 887.08 | STD. DEV. | 317.89 | SKEWNESS | .95 |
| MEDIAN | 879.30 | COEF. VAR. | 35.84 | ACCURACY | 2.66 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 89.50 | 788.00 | 868.40 | 927.00 | 986.50 |
| 135.80 | 811.40 | 868.50 | 927.80 | 1002.00 |
| 244.00 | 812.50 | 875.00 | 927.80 | 1020.00 |
| 260.00 | 814.10 | 875.10 | 928.60 | 1043.80 |
| 368.90 | 819.20 | 879.00 | 932.10 | 1050.00 |
| 438.50 | 837.60 | 879.20 | 935.70 | 1085.70 |
| 471.00 | 841.00 | 879.40 | 936.00 | 1087.00 |
| 621.90 | 847.40 | 899.70 | 937.40 | 1278.40 |
| 737.00 | 850.00 | 902.00 | 939.70 | 1521.00 |
| 757.00 | 853.40 | 904.00 | 951.30 | 1527.00 |
| 759.50 | 859.80 | 906.30 | 954.40 | 1911.00 |
| 767.50 | 860.00 | 917.90 | 955.80 | 2182.60 |
| 776.60 | 860.00 | 918.60 | 969.90 | |
| 781.20 | 868.00 | 926.00 | 972.90 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 3 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 66 | RANGE | 1437.50 | C.I.(UPPER) | 911.50 |
| TRUE-VALUE | 856.51 | VARIANCE | 60960.85 | C.I.(LOWER) | 792.37 |
| MEAN | 851.93 | STD. DEV. | 246.90 | SKEWNESS | -.75 |
| MEDIAN | 879.10 | COEF. VAR. | 28.98 | ACCURACY | 2.64 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 89.50 | 788.00 | 868.40 | 927.00 | 986.50 |
| 135.80 | 811.40 | 868.50 | 927.80 | 1002.00 |
| 244.00 | 812.50 | 875.00 | 927.80 | 1020.00 |
| 260.00 | 814.10 | 875.10 | 928.60 | 1043.80 |
| 368.90 | 819.20 | 879.00 | 932.10 | 1050.00 |
| 438.50 | 837.60 | 879.20 | 935.70 | 1085.70 |
| 471.00 | 841.00 | 879.40 | 936.00 | 1087.00 |
| 621.90 | 847.40 | 899.70 | 937.40 | 1278.40 |
| 737.00 | 850.00 | 902.00 | 939.70 | 1521.00 |
| 757.00 | 853.40 | 904.00 | 951.30 | 1527.00 |
| 759.50 | 859.80 | 906.30 | 954.40 | |
| 767.50 | 860.00 | 917.90 | 955.80 | |
| 776.60 | 860.00 | 918.60 | 969.90 | |
| 781.20 | 868.00 | 926.00 | 972.90 | |

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EPA-287 (Cin.)
(4-76)

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 4

| | | | | | |
|---|---|---|---|---|---|
| N | 68 | RANGE | 1506.60 | C.I.(UPPER) | 728.42 |
| TRUE-VALUE | 627.45 | VARIANCE | 50354.51 | C.I.(LOWER) | 621.74 |
| MEAN | 675.08 | STD. DEV. | 224.40 | SKEWNESS | 1.33 |
| MEDIAN | 665.70 | COEF. VAR. | 33.24 | ACCURACY | 6.10 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 89.60 | 618.00 | 648.60 | 680.00 | 740.00 |
| 173.00 | 620.50 | 648.70 | 680.60 | 744.00 |
| 190.00 | 621.60 | 652.00 | 686.80 | 744.50 |
| 329.00 | 623.40 | 656.00 | 687.40 | 748.30 |
| 341.00 | 623.80 | 658.50 | 693.30 | 756.80 |
| 468.80 | 624.60 | 664.80 | 695.60 | 780.20 |
| 517.00 | 626.00 | 666.60 | 696.00 | 781.00 |
| 530.00 | 629.30 | 667.20 | 703.00 | 969.50 |
| 557.10 | 633.00 | 667.40 | 711.00 | 1130.50 |
| 582.00 | 636.00 | 668.10 | 722.00 | 1288.00 |
| 589.00 | 641.00 | 670.00 | 727.10 | 1426.10 |
| 600.00 | 643.40 | 675.00 | 728.40 | 1596.20 |
| 612.30 | 643.60 | 679.90 | 728.60 | |
| 614.00 | 643.70 | 679.90 | 737.20 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 4 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 65 | RANGE | 1040.90 | C.I.(UPPER) | 677.21 |
| TRUE-VALUE | 627.45 | VARIANCE | 23519.69 | C.I.(LOWER) | 602.64 |
| MEAN | 639.93 | STD. DEV. | 153.36 | SKEWNESS | -1.09 |
| MEDIAN | 658.50 | COEF. VAR. | 23.97 | ACCURACY | 4.95 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 89.60 | 618.00 | 648.60 | 680.00 | 740.00 |
| 173.00 | 620.50 | 648.70 | 680.60 | 744.00 |
| 190.00 | 621.60 | 652.00 | 686.80 | 744.50 |
| 329.00 | 623.40 | 656.00 | 687.40 | 748.30 |
| 341.00 | 623.80 | 658.50 | 693.30 | 756.80 |
| 468.80 | 624.60 | 664.80 | 695.60 | 780.20 |
| 517.00 | 626.00 | 666.60 | 696.00 | 781.00 |
| 530.00 | 629.30 | 667.20 | 703.00 | 969.50 |
| 557.10 | 633.00 | 667.40 | 711.00 | 1130.50 |
| 582.00 | 636.00 | 668.10 | 722.00 | |
| 589.00 | 641.00 | 670.00 | 727.10 | |
| 600.00 | 643.40 | 675.00 | 728.40 | |
| 612.30 | 643.60 | 679.90 | 728.60 | |
| 614.00 | 643.70 | 679.90 | 737.20 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - B

| | | | | | |
|---|---|---|---|---|---|
| N | 68 | RANGE | 1059.20 | C.I.(UPPER) | 498.99 |
| TRUE-VALUE | 428.26 | VARIANCE | 23998.81 | C.I.(LOWER) | 425.35 |
| MEAN | 462.17 | STD. DEV. | 154.92 | SKEWNESS | 1.46 |
| MEDIAN | 447.90 | COEF. VAR. | 33.52 | ACCURACY | 6.59 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 64.30 | 421.20 | 438.00 | 462.50 | 498.00 |
| 122.00 | 423.10 | 439.10 | 464.10 | 506.60 |
| 130.00 | 425.00 | 441.00 | 466.00 | 514.60 |
| 225.50 | 427.90 | 441.50 | 472.00 | 515.60 |
| 266.60 | 429.00 | 446.20 | 472.00 | 520.20 |
| 292.80 | 429.70 | 446.90 | 473.40 | 573.00 |
| 368.70 | 430.00 | 448.90 | 474.10 | 630.00 |
| 383.00 | 430.60 | 452.90 | 480.70 | 638.70 |
| 384.80 | 431.00 | 454.00 | 481.90 | 767.50 |
| 401.70 | 432.00 | 456.00 | 483.40 | 834.50 |
| 404.50 | 435.00 | 457.80 | 487.80 | 1000.40 |
| 410.20 | 435.90 | 459.40 | 491.90 | 1123.50 |
| 413.00 | 436.20 | 460.00 | 492.50 | |
| 415.00 | 437.00 | 461.60 | 493.60 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - B **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 66 | RANGE | 770.20 | C.I.(UPPER) | 471.73 |
| TRUE-VALUE | 428.26 | VARIANCE | 13216.41 | C.I.(LOWER) | 416.26 |
| MEAN | 443.99 | STD. DEV. | 114.96 | SKEWNESS | -.28 |
| MEDIAN | 446.55 | COEF. VAR. | 25.89 | ACCURACY | 4.27 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 64.30 | 421.20 | 438.00 | 462.50 | 498.00 |
| 122.00 | 423.10 | 439.10 | 464.10 | 506.60 |
| 130.00 | 425.00 | 441.00 | 466.00 | 514.60 |
| 225.50 | 427.90 | 441.50 | 472.00 | 515.60 |
| 266.60 | 429.00 | 446.20 | 472.00 | 520.20 |
| 292.80 | 429.70 | 446.90 | 473.40 | 573.00 |
| 368.70 | 430.00 | 448.90 | 474.10 | 630.00 |
| 383.00 | 430.60 | 452.90 | 480.70 | 638.70 |
| 384.80 | 431.00 | 454.00 | 481.90 | 767.50 |
| 401.70 | 432.00 | 456.00 | 483.40 | 834.50 |
| 404.50 | 435.00 | 457.80 | 487.80 | |
| 410.20 | 435.90 | 459.40 | 491.90 | |
| 413.00 | 436.20 | 460.00 | 492.50 | |
| 415.00 | 437.00 | 461.60 | 493.60 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9

| | | | | | |
|---|---|---|---|---|---|
| N | 68 | RANGE | 297.20 | C.I.(UPPER) | 127.68 |
| TRUE-VALUE | 109.55 | VARIANCE | 2191.49 | C.I.(LOWER) | 105.42 |
| MEAN | 116.55 | STD. DEV. | 46.81 | SKEWNESS | 2.10 |
| MEDIAN | 111.30 | COEF. VAR. | 40.17 | ACCURACY | 1.60 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 20.00 | 102.00 | 109.70 | 114.00 | 123.70 |
| 30.00 | 102.30 | 110.00 | 114.30 | 123.90 |
| 33.00 | 103.00 | 110.10 | 115.00 | 125.10 |
| 50.50 | 103.50 | 110.80 | 116.20 | 125.70 |
| 72.70 | 104.30 | 111.00 | 116.30 | 129.50 |
| 79.50 | 105.00 | 111.20 | 117.00 | 132.50 |
| 80.00 | 105.00 | 111.40 | 119.10 | 153.00 |
| 86.80 | 106.00 | 111.50 | 119.20 | 202.50 |
| 94.50 | 106.60 | 111.80 | 119.50 | 220.00 |
| 95.50 | 107.00 | 112.00 | 119.60 | 269.10 |
| 95.70 | 107.00 | 112.10 | 120.20 | 274.40 |
| 97.90 | 107.20 | 113.00 | 120.60 | 317.20 |
| 98.70 | 107.30 | 113.10 | 122.00 | |
| 101.00 | 109.00 | 113.50 | 123.50 | |

INTER-LABORATORY STUDY 0379

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 65 | RANGE | 200.00 | C.I.(UPPER) | 115.77 |
| TRUE-VALUE | 109.55 | VARIANCE | 849.40 | C.I.(LOWER) | 101.60 |
| MEAN | 108.69 | STD. DEV. | 29.14 | SKEWNESS | .26 |
| MEDIAN | 111.00 | COEF. VAR. | 26.82 | ACCURACY | 1.32 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 20.00 | 102.00 | 109.70 | 114.00 | 123.70 |
| 30.00 | 102.30 | 110.00 | 114.30 | 123.90 |
| 33.00 | 103.00 | 110.10 | 115.00 | 125.10 |
| 50.50 | 103.50 | 110.80 | 116.20 | 125.70 |
| 72.70 | 104.30 | 111.00 | 116.30 | 129.50 |
| 79.50 | 105.00 | 111.20 | 117.00 | 132.50 |
| 80.00 | 105.00 | 111.40 | 119.10 | 153.00 |
| 86.80 | 106.00 | 111.50 | 119.20 | 202.50 |
| 94.50 | 106.60 | 111.80 | 119.50 | 220.00 |
| 95.50 | 107.00 | 112.00 | 119.60 | |
| 95.70 | 107.00 | 112.10 | 120.20 | |
| 97.90 | 107.20 | 113.00 | 120.60 | |
| 98.70 | 107.30 | 113.10 | 122.00 | |
| 101.00 | 109.00 | 113.50 | 123.50 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1

| | | | | | |
|---|---|---|---|---|---|
| N | 59 | RANGE | 1348.20 | C.I.(UPPER) | 788.00 |
| TRUE-VALUE | 697.00 | VARIANCE | 40122.89 | C.I.(LOWER) | 685.77 |
| MEAN | 736.88 | STD. DEV. | 200.31 | SKEWNESS | .64 |
| MEDIAN | 735.00 | COEF. VAR. | 27.18 | ACCURACY | 5.45 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 123.00 | 696.50 | 724.20 | 747.40 | 794.60 |
| 308.10 | 699.20 | 724.70 | 748.50 | 798.30 |
| 361.50 | 700.00 | 728.60 | 750.00 | 828.10 |
| 401.90 | 708.00 | 732.60 | 752.00 | 843.30 |
| 426.50 | 708.00 | 733.00 | 752.70 | 850.00 |
| 540.00 | 709.00 | 735.00 | 756.00 | 962.70 |
| 549.90 | 709.20 | 735.30 | 768.80 | 963.00 |
| 611.50 | 711.00 | 739.30 | 771.00 | 1032.20 |
| 632.50 | 712.00 | 740.00 | 771.30 | 1048.80 |
| 675.20 | 712.50 | 740.60 | 772.50 | 1387.00 |
| 688.00 | 718.00 | 744.70 | 780.40 | 1471.20 |
| 694.50 | 723.20 | 745.90 | 783.20 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 1 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 56 | RANGE | 740.70 | C.I.(UPPER) | 758.05 |
| TRUE-VALUE | 697.00 | VARIANCE | 17778.15 | C.I.(LOWER) | 688.20 |
| MEAN | 723.12 | STD. DEV. | 133.33 | SKEWNESS | -.70 |
| MEDIAN | 734.00 | COEF. VAR. | 18.44 | ACCURACY | 5.31 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 308.10 | 699.20 | 724.70 | 748.50 | 798.30 |
| 361.50 | 700.00 | 728.60 | 750.00 | 828.10 |
| 401.90 | 708.00 | 732.60 | 752.00 | 843.30 |
| 426.50 | 708.00 | 733.00 | 752.70 | 850.00 |
| 540.00 | 709.00 | 735.00 | 756.00 | 962.70 |
| 549.90 | 709.20 | 735.30 | 768.80 | 963.00 |
| 611.50 | 711.00 | 739.30 | 771.00 | 1032.20 |
| 632.50 | 712.00 | 740.00 | 771.30 | 1048.80 |
| 675.20 | 712.50 | 740.60 | 772.50 | |
| 688.00 | 718.00 | 744.70 | 780.40 | |
| 694.50 | 723.20 | 745.90 | 783.20 | |
| 696.50 | 724.20 | 747.40 | 794.60 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 2

| | | | | | |
|---|---|---|---|---|---|
| N | 59 | RANGE | 321.80 | C.I.(UPPER) | 182.10 |
| TRUE-VALUE | 159.30 | VARIANCE | 2288.21 | C.I.(LOWER) | 157.69 |
| MEAN | 169.89 | STD. DEV. | 47.84 | SKEWNESS | 1.39 |
| MEDIAN | 164.70 | COEF. VAR. | 28.16 | ACCURACY | 3.39 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 33.60 | 152.00 | 163.00 | 168.00 | 184.30 |
| 83.90 | 152.10 | 163.10 | 168.00 | 184.50 |
| 97.40 | 157.60 | 163.30 | 168.00 | 184.60 |
| 110.50 | 157.70 | 163.40 | 172.00 | 193.50 |
| 124.70 | 158.00 | 164.20 | 172.00 | 207.80 |
| 126.50 | 158.40 | 164.70 | 174.40 | 210.00 |
| 133.60 | 159.00 | 164.90 | 176.10 | 217.00 |
| 141.20 | 159.80 | 165.00 | 176.70 | 248.00 |
| 144.50 | 160.00 | 165.60 | 179.60 | 284.30 |
| 146.20 | 161.10 | 167.00 | 180.10 | 334.50 |
| 147.20 | 162.20 | 167.40 | 182.10 | 355.40 |
| 151.40 | 162.50 | 167.60 | 182.50 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 2 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 56 | RANGE | 200.40 | C.I.(UPPER) | 174.11 |
| TRUE-VALUE | 159.30 | VARIANCE | 942.10 | C.I.(LOWER) | 158.04 |
| MEAN | 166.07 | STD. DEV. | 30.69 | SKEWNESS | .79 |
| MEDIAN | 164.45 | COEF. VAR. | 18.48 | ACCURACY | 3.23 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 83.90 | 152.10 | 163.10 | 168.00 | 184.50 |
| 97.40 | 157.60 | 163.30 | 168.00 | 184.60 |
| 110.50 | 157.70 | 163.40 | 172.00 | 193.50 |
| 124.70 | 158.00 | 164.20 | 172.00 | 207.80 |
| 126.50 | 158.40 | 164.70 | 174.40 | 210.00 |
| 133.60 | 159.00 | 164.90 | 176.10 | 217.00 |
| 141.20 | 159.80 | 165.00 | 176.70 | 248.00 |
| 144.50 | 160.00 | 165.60 | 179.60 | 284.30 |
| 146.20 | 161.10 | 167.00 | 180.10 | |
| 147.20 | 162.20 | 167.40 | 182.10 | |
| 151.40 | 162.50 | 167.60 | 182.50 | |
| 152.00 | 163.00 | 168.00 | 184.30 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 5

| | | | | | |
|---|---|---|---|---|---|
| N | 58 | RANGE | 1805.90 | C.I.(UPPER) | 1026.97 |
| TRUE-VALUE | 896.20 | VARIANCE | 90028.45 | C.I.(LOWER) | 872.53 |
| MEAN | 949.75 | STD. DEV. | 300.05 | SKEWNESS | .69 |
| MEDIAN | 924.50 | COEF. VAR. | 31.59 | ACCURACY | 3.16 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 196.80 | 870.00 | 916.60 | 958.90 | 1076.20 |
| 239.60 | 870.50 | 918.70 | 962.00 | 1090.00 |
| 284.70 | 883.00 | 919.50 | 964.60 | 1116.60 |
| 436.40 | 884.90 | 924.00 | 965.20 | 1230.10 |
| 505.60 | 886.00 | 924.00 | 966.50 | 1236.00 |
| 710.00 | 890.00 | 925.00 | 998.40 | 1264.70 |
| 776.90 | 895.90 | 927.70 | 1008.00 | 1314.40 |
| 796.50 | 898.80 | 931.00 | 1009.40 | 1715.00 |
| 801.30 | 900.00 | 938.00 | 1019.30 | 1820.40 |
| 859.00 | 906.50 | 941.90 | 1023.50 | 2002.70 |
| 865.90 | 908.00 | 945.70 | 1056.00 | |
| 866.60 | 916.50 | 957.20 | 1068.80 | |

INTER-LABORATORY STUDY 1079

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 5 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 56 | RANGE | 1518.20 | C.I.(UPPER) | 978.56 |
| TRUE-VALUE | 896.20 | VARIANCE | 58160.06 | C.I.(LOWER) | 852.23 |
| MEAN | 915.40 | STD. DEV. | 241.16 | SKEWNESS | -.53 |
| MEDIAN | 924.00 | COEF. VAR. | 26.35 | ACCURACY | 3.10 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 196.80 | 870.00 | 916.60 | 958.90 | 1076.20 |
| 239.60 | 870.50 | 918.70 | 962.00 | 1090.00 |
| 284.70 | 883.00 | 919.50 | 964.60 | 1116.60 |
| 436.40 | 884.90 | 924.00 | 965.20 | 1230.10 |
| 505.60 | 886.00 | 924.00 | 966.50 | 1236.00 |
| 710.00 | 890.00 | 925.00 | 998.40 | 1264.70 |
| 776.90 | 895.90 | 927.70 | 1008.00 | 1314.40 |
| 796.50 | 898.80 | 931.00 | 1009.40 | 1715.00 |
| 801.30 | 900.00 | 938.00 | 1019.30 | |
| 859.00 | 906.50 | 941.90 | 1023.50 | |
| 865.90 | 908.00 | 945.70 | 1056.00 | |
| 866.60 | 916.50 | 957.20 | 1068.80 | |

INTER-LABORATORY STUDY 1C79

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 7

| | | | | | |
|---|---|---|---|---|---|
| N | 59 | RANGE | 1392.30 | C.I.(UPPER) | 297.62 |
| TRUE-VALUE | 236.50 | VARIANCE | 28167.91 | C.I.(LOWER) | 211.97 |
| MEAN | 254.80 | STD. DEV. | 167.83 | SKEWNESS | 6.03 |
| MEDIAN | 228.90 | COEF. VAR. | 65.87 | ACCURACY | -3.21 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 51.70 | 216.50 | 224.00 | 238.00 | 251.00 |
| 124.40 | 216.80 | 225.80 | 239.90 | 256.80 |
| 144.70 | 219.00 | 226.00 | 240.00 | 260.00 |
| 168.40 | 220.00 | 226.90 | 243.20 | 264.10 |
| 170.50 | 220.60 | 227.50 | 243.60 | 272.20 |
| 170.60 | 220.70 | 228.90 | 244.00 | 304.00 |
| 185.20 | 221.30 | 230.00 | 245.30 | 328.10 |
| 196.60 | 221.70 | 231.20 | 248.50 | 364.50 |
| 207.50 | 222.00 | 232.80 | 248.90 | 421.50 |
| 207.80 | 222.80 | 236.80 | 249.40 | 456.80 |
| 213.80 | 223.00 | 237.50 | 249.50 | 1444.00 |
| 216.20 | 223.00 | 238.00 | 249.50 | |

INTER-LABORATORY STUDY 1C79

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 7 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 58 | RANGE | 405.10 | C.I.(UPPER) | 249.35 |
| TRUE-VALUE | 236.50 | VARIANCE | 3423.71 | C.I.(LOWER) | 219.23 |
| MEAN | 234.29 | STD. DEV. | 58.51 | SKEWNESS | 1.02 |
| MEDIAN | 228.20 | COEF. VAR. | 24.97 | ACCURACY | -3.51 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 51.70 | 216.50 | 224.00 | 238.00 | 251.00 |
| 124.40 | 216.80 | 225.80 | 239.90 | 256.80 |
| 144.70 | 219.00 | 226.00 | 240.00 | 260.00 |
| 168.40 | 220.00 | 226.90 | 243.20 | 264.10 |
| 170.50 | 220.60 | 227.50 | 243.60 | 272.20 |
| 170.60 | 220.70 | 228.90 | 244.00 | 304.00 |
| 185.20 | 221.30 | 230.00 | 245.30 | 328.10 |
| 196.60 | 221.70 | 231.20 | 248.50 | 364.50 |
| 207.50 | 222.00 | 232.80 | 248.90 | 421.50 |
| 207.80 | 222.80 | 236.80 | 249.40 | 456.80 |
| 213.80 | 223.00 | 237.50 | 249.50 | |
| 216.20 | 223.00 | 238.00 | 249.50 | |

INTER-LABORATORY STUDY 1C79

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9

| | | | | | |
|---|---|---|---|---|---|
| N | 58 | RANGE | 880.50 | C.I.(UPPER) | 590.72 |
| TRUE-VALUE | 526.00 | VARIANCE | 19886.46 | C.I.(LOWER) | 518.14 |
| MEAN | 554.43 | STD. DEV. | 141.02 | SKEWNESS | .64 |
| MEDIAN | 539.00 | COEF. VAR. | 25.43 | ACCURACY | 2.47 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 160.70 | 518.90 | 535.60 | 562.20 | 610.10 |
| 174.70 | 520.10 | 536.60 | 562.50 | 621.70 |
| 290.00 | 521.00 | 536.80 | 565.00 | 621.70 |
| 340.00 | 522.00 | 537.50 | 570.00 | 659.80 |
| 389.50 | 526.80 | 538.00 | 570.20 | 704.20 |
| 433.50 | 527.00 | 540.00 | 571.20 | 715.00 |
| 486.60 | 528.00 | 542.70 | 577.70 | 769.50 |
| 491.10 | 529.00 | 545.00 | 585.00 | 793.60 |
| 496.30 | 531.10 | 552.10 | 587.00 | 1029.00 |
| 497.00 | 531.30 | 554.40 | 588.80 | 1041.20 |
| 513.00 | 535.00 | 557.10 | 601.30 | |
| 513.50 | 535.10 | 558.00 | 605.30 | |

INTER-LABORATORY STUDY 1C79

POLLUTANT - NOX UNITS - MILLIGRAMS PER DRY STD CUBIC METER

SAMPLE NUMBER - 9 **** WITH OUTLIERS REMOVED ****

| | | | | | |
|---|---|---|---|---|---|
| N | 55 | RANGE | 618.90 | C.I.(UPPER) | 569.81 |
| TRUE-VALUE | 526.00 | VARIANCE | 9453.46 | C.I.(LOWER) | 518.41 |
| MEAN | 544.11 | STD. DEV. | 97.23 | SKEWNESS | -.82 |
| MEDIAN | 538.00 | COEF. VAR. | 17.87 | ACCURACY | 2.28 |

DATA IN ASCENDING ORDER

| | | | | |
|---|---|---|---|---|
| 174.70 | 520.10 | 536.60 | 562.50 | 621.70 |
| 290.00 | 521.00 | 536.80 | 565.00 | 621.70 |
| 340.00 | 522.00 | 537.50 | 570.00 | 659.80 |
| 389.50 | 526.80 | 538.00 | 570.20 | 704.20 |
| 433.50 | 527.00 | 540.00 | 571.20 | 715.00 |
| 486.60 | 528.00 | 542.70 | 577.70 | 769.50 |
| 491.10 | 529.00 | 545.00 | 585.00 | 793.60 |
| 496.30 | 531.10 | 552.10 | 587.00 | |
| 497.00 | 531.30 | 554.40 | 588.80 | |
| 513.00 | 535.00 | 557.10 | 601.30 | |
| 513.50 | 535.10 | 558.00 | 605.30 | |
| 518.90 | 535.60 | 562.20 | 610.10 | |

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# APPENDIX D: INSTRUCTIONS FOR USE OF ENVIRONMENTAL PROTECTION AGENCY METHOD 5 DRY GAS METER PERFORMANCE TEST DEVICE

**NOTE: All procedures referrred to are from revised Method 5 published in the Federal Register, Vol. 12, No. 160, Part II, Thursday, August 18, 1977, pp. 41776-41782 and references contained therein. This revised method should be adhered to in all details in the use of this quality assurance performance device.**

**EQUIPMENT: The participant in this study should possess the following equipment, including the performance test device supplied by EPA.**

| Quantity | Item |
|---|---|
| 1 | Method 5/Source Sampling Meter Box |
| 1 | Stopwatch, preferably calibrated in decimal minutes |
| 1 | Thermometer, ambient range |
| 1 | Barometer. If unavailable, call nearest National Weather Service and request the ABSOLUTE barometric pressure. (Corrected for temperature and acceleration due to gravity, but not corrected for altitude.) |
| 1 | Performance Test Device. A calibrated flow orifice housed in a quick-connect coupling and identified with an engraved three-digit serial number. WARNING: THE DEVICE MUST NOT BE DISASSEMBLED UNDER ANY CIRCUMSTANCES. Use these devices at room temperature. |

PROCEDURE:

1. Remove the performance test device from its case and insert it into the gas inlet quick-connect coupling on the source sampling meter box.
2. Turn the power to the meter box on and start the pump.
3. Adjust the coarse flow rate control valve and the fine flow rate control valve to give a maximum vacuum reading. CAUTION: A vacuum reading of less than 17 inches Hg will result in flow rate errors.
4. Allow the orifice and source sampling meter box to warm up for 45 minutes with flow controls adjusted as described in Step 3 before starting quality assurance runs.
5. Make triplicate quality assurance runs. For each run, record initial and final dry gas meter volumes, dry gas meter inlet and outlet temperatures, internal orifice pressure drop ($\Delta H$), ambient temperature, and barometric pressure. Run duration should be slightly greater than 15 minutes. The following procedure is recommended. Fifteen minutes after a run is started, the participant watches the dry gas meter needle closely. As the needle reaches the zero (12 o'clock) position, the pump and stopwatch are stopped simultaneously. The dry gas meter volume and time are recorded.
   This complete run procedure is performed three times to provide the required triplicate quality assurance runs.
6. Calculate the corrected dry gas volume for each run using equation 5.1 of the above-referenced Method 5. For each replicate, record the corrected dry gas volume in dry standard cubic meters, the sampling time in decimal minutes, the barometric pressure in mm Hg, and the ambient temperature in degrees Celcius on the enclosed data card. Be sure to record the performance test device serial number on the data card in the column headed "Orifice Number."
   NOTE 1: If you calculate dry gas volume in English Units, use the conversion factor of 0.02832 $m^3$ $ft^3$ to obtain the volume in metric units.
   NOTE 2: If your stopwatch is not in decimal minutes, be sure to convert (e.g. 15 minutes 20 seconds is reported as 15.33 minutes)
7. After recording the requested data on the enclosed data form, return the data form and the performance test device to:

   Quality Assurance Division (MD-77)
   Environmental Monitoring Systems Laboratory
   Environmental Protection Agency
   Research Triangle Park, North Carolina 27711
   Attention: Robert G. Fuerst

   A postpaid return envelope and label are enclosed for this purpose.

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## INSTRUCTIONS FOR USE OF ENVIRONMENTAL PROTECTION AGENCY STATIONARY SOURCE QUALITY ASSURANCE $SO_2$ REFERENCE SAMPLES

**Note:** All Method 6 procedures referred to are from the amended method published in the *Federal Register* Vol. 42, No. 160, Part II, Thursday, August 18, 1977, pp 41782-41784. This amended method should be adhered to in all details in the analysis of these reference standards.

1. Prepare 3-percent hydrogen peroxide according to Section 3.1.3 of the method (30 ml is required for each sample and each blank).

2. Prepare each reference sample for analysis as follows: Wrap a paper towel around the ampule and with the ampule in an upright position break off the top at the prescored mark by exerting pressure sideways. From the ampule pipette exactly 5 ml of the reference sample into a 100-ml volumetric flask. Add 30 ml of 3-percent hydrogen peroxide solution. Dilute exactly to the mark with deionized, distilled water. Analyze the sample in accordance with the procedure detailed in Section 4.3 of the method, beginning with "Pipette a 20-ml aliquot of this solution. . . ." (Note: If more than 50 ml of barium perchlorate titrant is required for any sample analysis, a smaller aliquot should be selected to allow titration with less than 50-ml titrant.)

3. **Calculate the concentration, $C_{SO_2}$ (concentration of sulfur dioxide, dry basis, corrected to standard conditions, mg/dscm), using Equation 6-2.** A value of $21 \times 10^{-3}$ dscm should be used for $V_m(std)$, in the equation. A value of 100 ml should be used for $V_{soln}$ in the equation.

4. Record the reference standard sample numbers and their corresponding $SO_2$ concentrations in mg/dscm on the enclosed data form. Return the form to:

   Quality Assurance Division (MD 77)
   Environmental Monitoring Systems Laboratory
   Environmental Protection Agency
   Research Triangle Park, N.C. 27711
   Attn: Robert G. Fuerst

If other than EPA Method 6 is used for your analyses, please explain in detail your analytical procedure on the back of the enclosed data form.

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## INSTRUCTIONS FOR USE OF ENVIRONMENTAL PROTECTION AGENCY STATIONARY SOURCE QUALITY ASSURANCE $NO_x$ REFERENCE SAMPLES

**Note:** All Method 7 procedures referred to are from the amended method published in the *Federal Register* Vol. 42, No. 160, Part II, Thursday, August 18, 1977, pp 41784-41786. This amended method should be adhered to in all details in the analysis of these reference standards.

1. Prepare absorbing solution according to Section 3.1 of the method.

2. Prepare each reference sample for analysis as follows: Wrap a paper towel around the ampule and with the ampule in an upright position break off the top at the prescored mark by exerting pressure sideways. From the ampule pipette exactly 5 ml of the reference sample into a 100-ml beaker. Add 25 ml absorbing solution to the beaker; adjust the pH to 9-12 (using pH paper as indicated in Section 4.2 of the method) by dropwise addition of sodium hydroxide (1N). Quantitatively transfer the contents of the beaker to a 50-ml volumetric flask and dilute exactly to the mark with deionized, distilled water. Mix thoroughly and pipette a 25-ml aliquot of the diluted sample into a porcelain evaporating dish. Beginning with the evaporation step in Section 4.3, complete the sample analysis.

3. Calculate total $\mu g$ $NO_2$ per sample using Equation 7-3. Calculate the sample concentration, $C$ (concentration of $NO_x$ as $NO_2$, dry basis, corrected to standard conditions, mg/dscm), using Equation 7-4. A value of 2000 ml should be used for $V_{sc}$ in Equation 7-4.

4. Record the reference sample numbers and their corresponding concentrations, $C$, in mg/dscm on the enclosed data form. Return the form to:

   Quality Assurance Division (MD 77)
   Environmental Monitoring Systems Laboratory
   Environmental Protection Agency
   Research Triangle Park, N.C. 27711
   Attn: Robert G. Fuerst

If other than EPA Method 7 is used for your analyses, please explain in detail your analytical procedure on the back of the enclosed data form.

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